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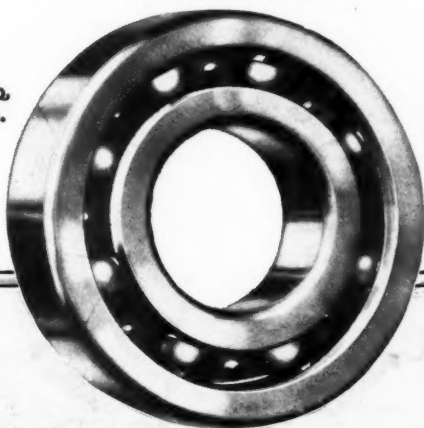
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The AUTOMOBILE and Automotive Industries

VOL. XXXVII

NEW YORK—THURSDAY, AUGUST 16, 1917—CHICAGO

No. 7

Plan Better Tractor Meeting for 1918

Need for Organized Tests Realized—
Fremont Demonstrations of Little Value
—Tractors Show Slight Improvement—
Many Automotive Engineers Present

By David Beecroft

FREMONT, NEB., Aug. 11—The national tractor demonstrations which have been running for 5 days on 3000 acres of land near this city closed to-day and it is very debatable if another demonstration of the same nature will be held here or at any other place next year. The demonstrations this year were not by any means the success they were in former years. The attendance was far below that of last year; in fact, the attendance on all 5 days scarcely equalled that of one day a year ago, that day being known last year as Henry Ford Day. Ford and his tractor were not present this year. That may account for some of the reduced attendance and interest. The weather was not favorable, rain on the Saturday previous to the opening, as well as on the opening day, made plowing impossible on Monday and Tuesday so that plowing was done only on Wednesday, Thursday and Friday, and on those 3 days there was scarcely one good day's plowing done.

The basic reason why there will scarcely be any more demonstrations of the present kind is that they tell nothing. There is no classification of

competing machines. There are no awards. There is no definite program. No record is kept of the amount of work done by any tractor, the amount of fuel used, nature of troubles, etc. In short the trials prove nothing more than that tractors built by forty-three different concerns were able to go out and plow. The rules

did not require them to plow continuously for an entire day. One day they started plowing at 10 o'clock, another day the start was just at 12 and the last day the start was not until 1 o'clock.

The demonstrations were put on as a national advertising movement by the makers, but as such they were a hopeless failure, because there was no national message to give to the country. As a result there was very little publicity and what went out did not carry any educational value. Daily paper representatives came from a few distant cities, but there were no facts for them. Nobody knew how much land was plowed each day, nobody knew how much any tractor plowed in an hour or in any other definite time. Nobody knew how much gasoline or kerosene was used per acre in plowing by the different types of machines. Nobody had a chance of seeing the machines work at capacity for consecutive hours in order to get an accurate estimate on the mechanical merits of the different tractors. It was impossible to draw any definite deductions.

What kind of demonstrations will

To Organize Tractor Demonstrations

Tractor demonstrations are needed to show the ability and quality of each machine.

Present demonstrations show nothing, not even whether a tractor will do a single day's work without trouble.

Plans are being laid for organized demonstrations for 1918 to show real facts about tractors.

Definite tasks will be set and official records kept, though there will be no competition.

Some such program is essential for the elimination of faulty types of tractor.



General view of the tractor camp, Fremont, Neb., as it appeared on Tuesday, Aug. 7. The attendance this day was particularly poor, owing on either side of a central space, but if the ground assigned to each manufacturer had been more definitely

be held next year may be partly decided at Chicago on Friday, Aug. 17, when several of the members of the Implement and Vehicle Assn., which conducts the trials, will meet to discuss next year's program. That there was much discontent with this year's demonstrations was shown by the groups of makers frequently seen around the grounds, discussing more useful trials for another year.

Many makers favor real tractor tests similar to the strenuous automobile reliability trials conducted in this country and in England and France in the early days of the automobile industry. They all agreed that the chaotic condition of the tractor industry to-day requires a severe test in order to eliminate those faulty designs that are continuing to exist solely because present demonstrations permit each maker to set up his own standard of demonstration. Hence weaknesses are not revealed.

The propositions with reference to next year's test include several suggestions as follows, in which penalties are imposed for all repair work that has to be done on a tractor dur-

ing the trials, and an official report published showing every detail of the standing of all machines. No awards of any nature would be made and no prizes offered, but a very comprehensive report issued which would be most valuable not only to all tractor makers but to the distributing and retailing parts of the industry as well.

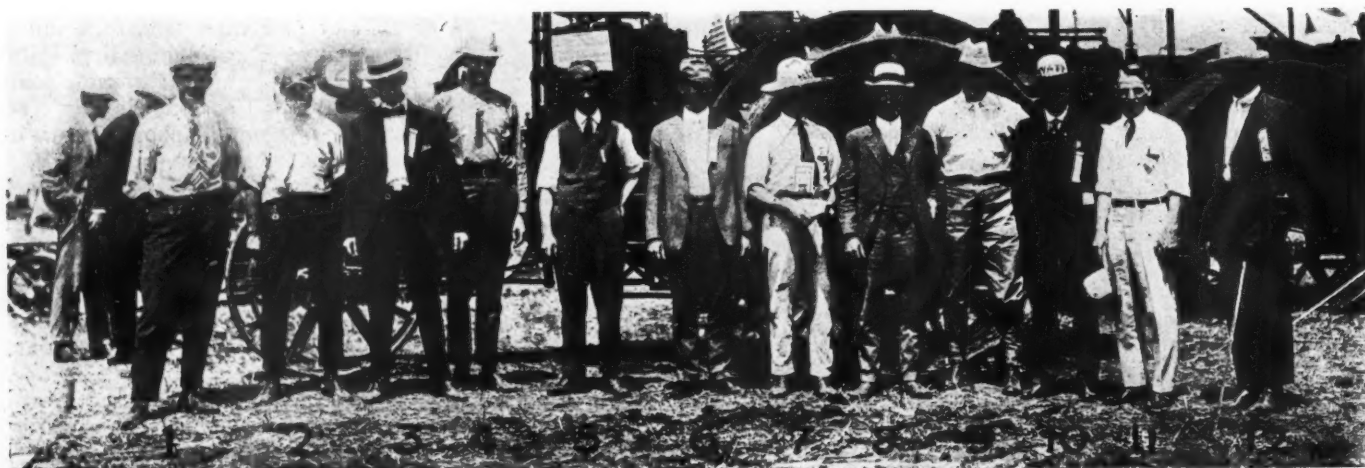
1—Only stock tractors be permitted to compete and the stock status of such be determined by a technical committee that would visit the tractor factories previous to the demonstrations and then check the tractors up at the demonstrations.

2—An accurate record be kept of all fuel used, amount of work done and also of lubricants used.

3—That official observers appointed by the different companies ride on the trac-



General view of the interior of one of the accessory tents



Twin City tractor delegation: 1—E. L. Treem. 2—E. W. Bicking. 3—T. A. Butree. 4—C. H. Dickeson. 5—L. S. Plitt. 6—K. C. Moniz. 7—R. H. Green. 8—W. H. Peterson. 9—J. L. Kuhn. 10—H. C. Buffington. 11—A. W. Scarratt. 12—W. B. Nelson



to the heavy rains of the previous night, evidences of which are conspicuous in the photographs. The tents were arranged roughly marked out the general arrangement and ease of studying the exhibits would have been greatly improved

tors during the demonstrations and give official reports on details required.

4—That each tractor during its plowing carry a draw-bar dynamometer and that tractor be penalized if it fails to average its rated pull and rewarded if its average shows above the rated pull.

5—That penalties be imposed by all work done on tractor during demonstrating periods.

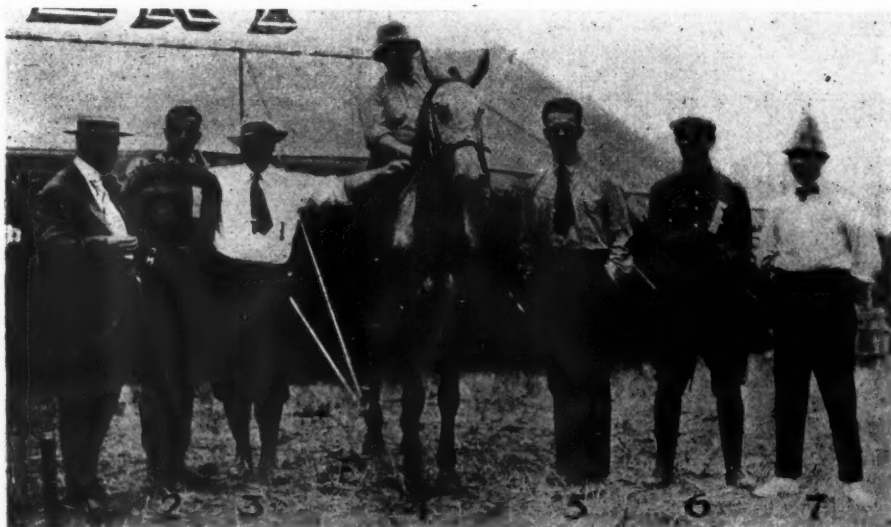
6—That penalties be imposed for taking on water, fuel or lubricant within certain time limits.

7—That there be a plowing eliminating

test of perhaps 5 hr. followed by a 2-hr. belt test and that tractors not obtaining a certain percentage in such tests be not permitted to compete in the final plowing test of 10 or 12 consecutive hours on which the official report would be based.

8—That merit marks be given for efficiency in using both gasoline and kerosene, and that if possible some efforts be made to develop the use of alcohol as a fuel.

Much interest was added to the demonstrations by the presence of the Society of Automotive Engineers, which held a dinner and three meetings during the week. At the tractor dinner Wednesday evening over 450 tickets were sold, and the hall was jammed with makers, engineers, and representatives of foreign countries and distributors and dealers. Howard E. Coffin, of the Advisory Committee of the Council of National Defense, urged the tractor makers to make haste in standardization and also to follow the lead of the automobile and airplane makers in adopting patent cross-licensing agreements. To-day too many tractor people pride themselves on their possession of pat-

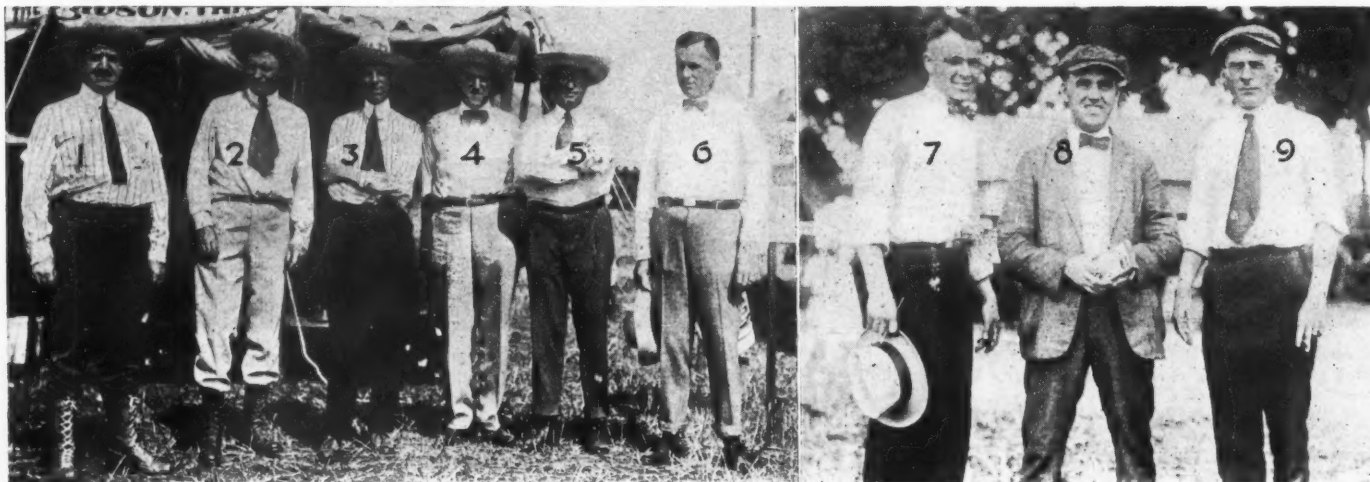


Vacuum Oil Co. representatives: 1—W. H. Buderus. 2—F. A. Peck. 3—D. W. Nyland. 4—W. J. Dukes. 5—G. A. Round. 6—C. K. Sinsabaugh. 7—B. B. Mears

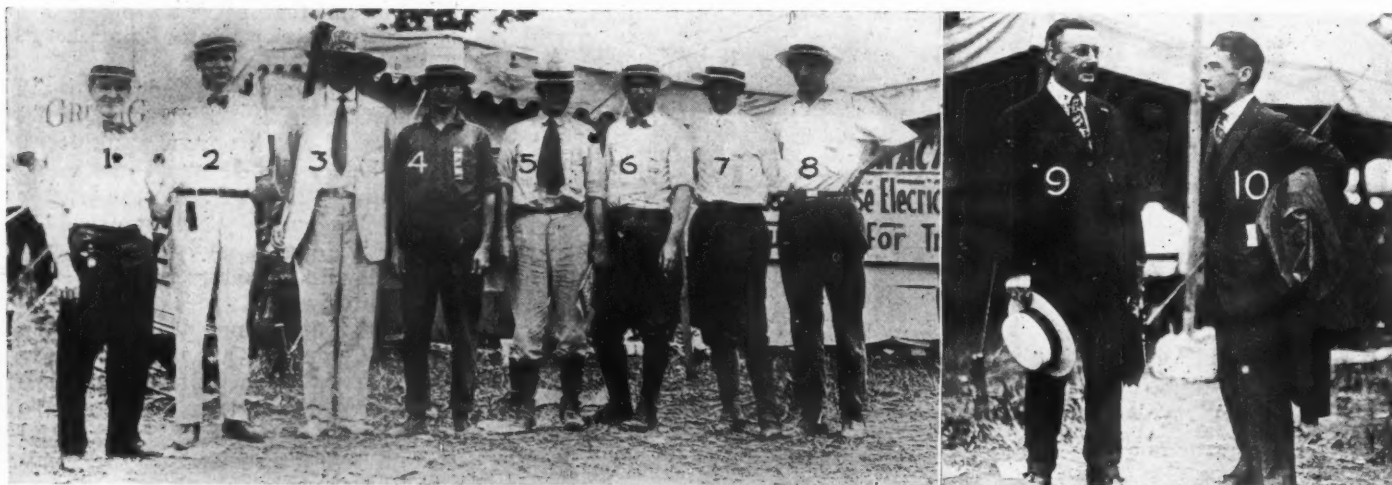


1—A. E. Hildebrand, manager of the demonstrations. In the center are five Four-Wheel Drive tractor men: 2—B. Jenkins. 3—J. Jenkins. 4—Logan. 5—Painter. 6—Johnson. 7—Fred Glover, chief engineer, Emerson-Brantingham Co.

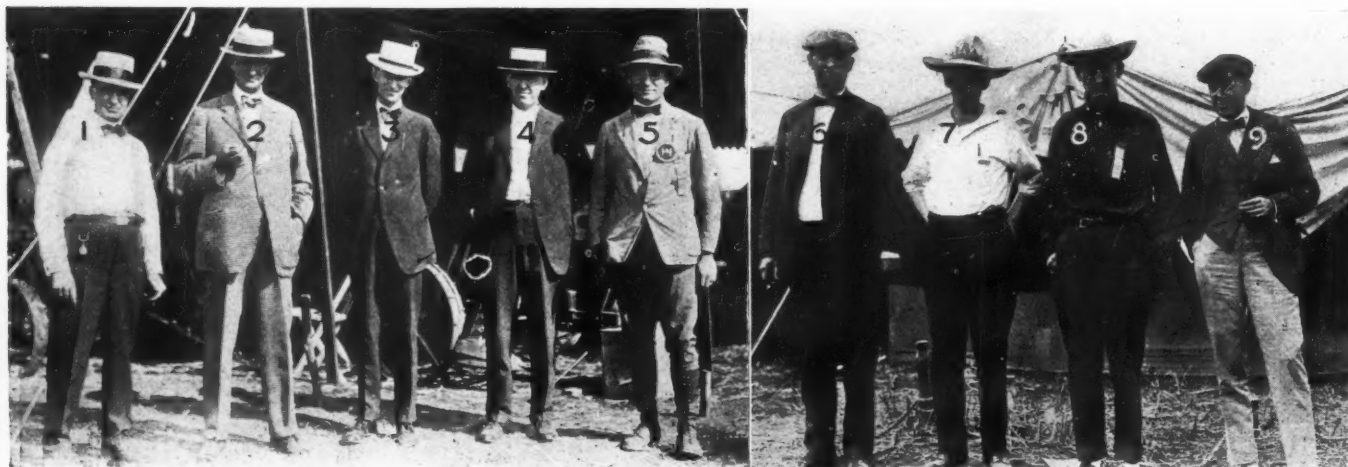
Men Prominent in Tractor Field



1—Jay G. Weiss. 2—J. G. Heaslet, consulting engineer Studebaker Corp. 3—A. P. Sloan, Jr., president United Motors Corp. 4—George W. Dunham, consulting engineer now assisting the Government in the motorization of field artillery at Washington. 5—Roy D. Chapin, president Hudson Motor Car Co. 6—H. E. Griffith. At the right are three representatives of the Johnson Co. 7—Peter Peters. 8—George Thompson, district sales manager. 9—J. F. Gates

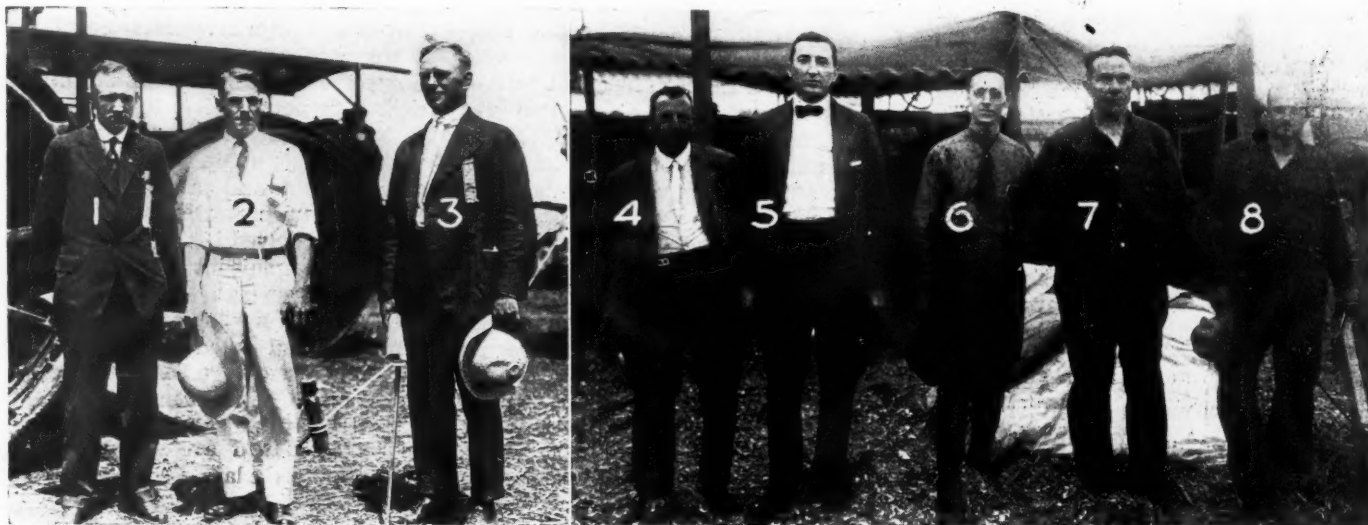


1—F. A. Dean. 2—L. S. Newman. 3—J. R. Bateman. 4—Thos. A. Russell. 5—H. O. Kuechenmeister. 6—Guy C. Brown. 7—H. M. Carroll. 8—J. E. Martin. 9—E. M. McCullough, manager National Implement & Vehicle Assn., Chicago. 10—Juan Homs, commercial agent, Bureau of Foreign and Domestic Commerce, Washington, D. C.

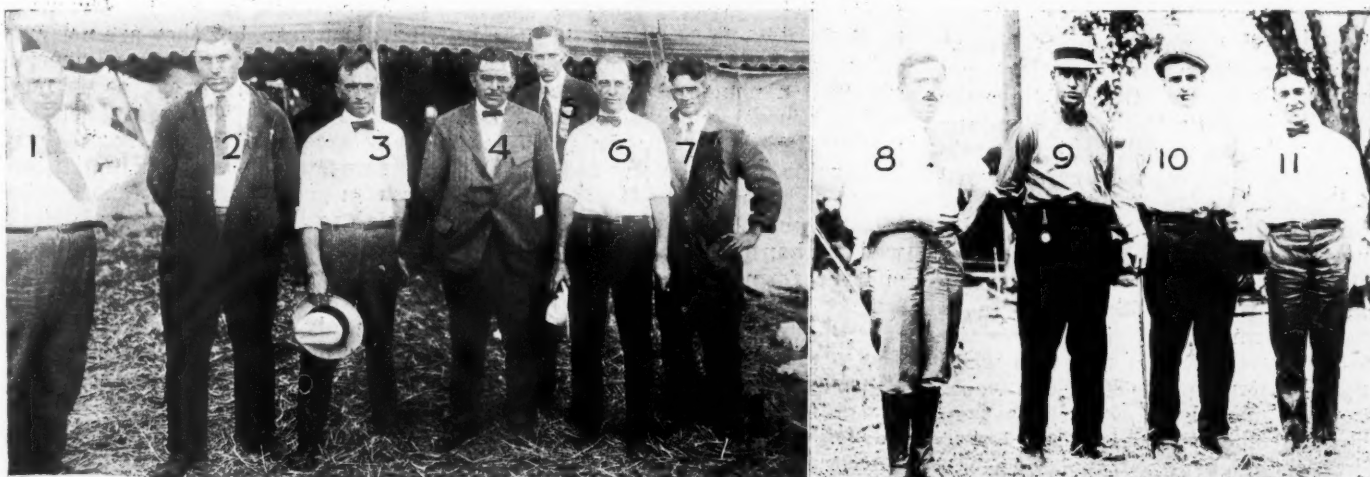


Moline Universal men: 1—O. R. Robb, manager Omaha branch. 2—D. Watson, Des Moines branch. 3—B. Funk, Engineering Manager. 4—F. G. Allen, vice-president and general manager. 5—S. S. Turkenkoph, charge of sales and service. At the right are four McQuay-Norris Mfg. Co. men: 6—L. A. Safford, second vice-president. 7—Theo. Rowe, St. Paul branch manager. 8—H. W. Knopp. 9—C. C. Pangman, advertising manager

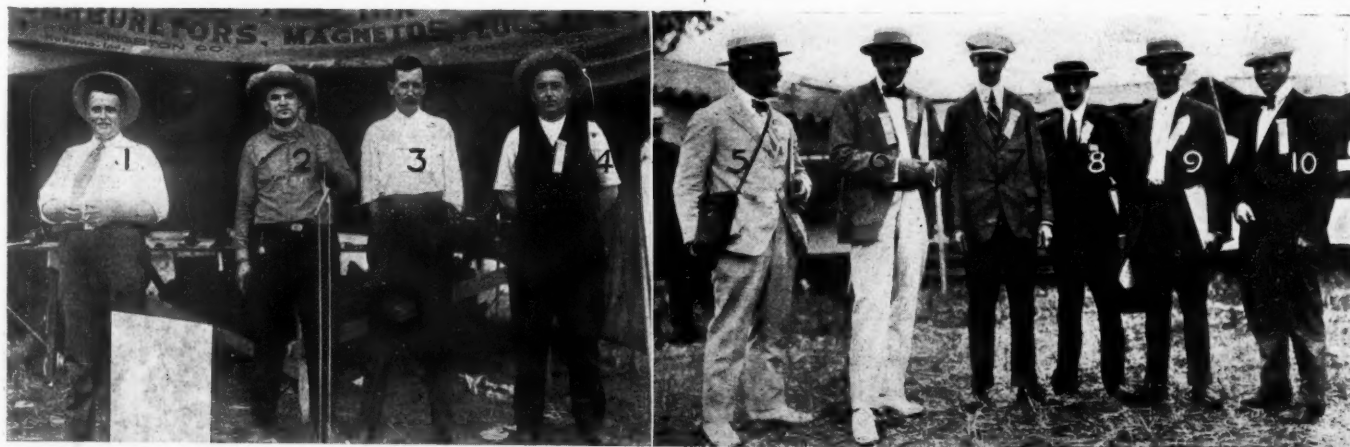
eld at the Fremont Demonstrations



Minneapolis Steel & Machinery Co., Twin City Tractor. 1—H. C. Buffington. 2—A. W. Scarratt. 3—W. B. Nelson. At the right are five Velie men: 4—W. E. Krebs, plow expert. 5—E. R. Gardner, sales manager. 6—O. E. Szekely, engine designer. 7—H. Mitchell, factory expert. 8—J. Farwell, factory mechanic



Bates Steel Mule Representatives: 1—C. H. Brantley. 2—A. H. Bremner. 3—Byron Snyder. 4—E. E. Bates. 5—C. R. Nichols. 6—H. H. Bates. 7—Leonard Spliers. At the right are grouped four S. K. F. Ball Bearing Co. men: 8—C. R. Mabley. 9—J. C. Long. 10—J. B. Cestino. 11—F. J. Rider



Two Byrne-Kingston men: 1—Paul Burke, general sales manager. 2—E. H. Geyer, eastern territory manager. At the right are two Kokomo Electric Co. representatives: 3—P. A. Wiley, superintendent in Kokomo. 4—J. P. Grace, secretary. At the extreme right are: 5—G. B. Dusenberry, western sales manager New Departure Mfg. Co. 6—J. H. Armstrong, Cutting, Armstrong & Smith Co. 7—J. T. R. Bell, Gurney Ball Bearing Co. 8—T. R. Thomas, Thomas & Thomas. 9—C. R. Armhurst, chief engineer H. J. Walker Co. 10—D. S. Hatch, editor Motor Age

ents and it may be possible that the industry will be harassed with patent litigation like the automobile industry was in its infancy.

Arnold P. Yerkes of the Bureau of Farm Management in the Department of Agriculture, Washington, D. C., speaking on Tractor Service from the farmer's viewpoint urged better service in the tractor—in a word, a better tractor rather than working out broad plans for keeping the tractor running after it is in the farmer's hands. The net conclusion from Mr. Yerkes' remarks was that the majority of the present tractors are not up to par and that the biggest boost the tractor makers can give to tractor service is to improve their machines. He based his remarks on information gained from a questionnaire conducted a year ago with 35,000 farmers that are actually using tractors on their farms.

In the second chapter of his tractor talk Mr. Yerkes urged an educational campaign among farmers on the mechanics of tractors. This sentiment was re-echoed time and again at the special meeting on Thursday night at which tractor service was the only subject discussed. Over 300 tractor boosters discussed the problem and the only conclusion was that a huge problem faces the tractor makers as well as the distributors and dealers. Farmers rarely house the tractors, leaving them out all fall in the rains and all winter in the snow. The tractor should be the finest bit of machinery on the farm and yet it receives the poorest care. It was urged to write special instruction books which would be much more humanly written than the automobile instruction books. They should be illustrated with colored sketches, showing how the differ-

ent systems, such as electrical and carburetion, are arranged and how they are related to all parts of the car.

Dent Parrett, president of the Parrett Tractor Co., advocated a special campaign to show how a tractor requires greater attention by way of lubrication than an automobile. To-day too many farmers attempt to give their tractors about the same attention as they give their automobiles. This results in many tractor failures, chiefly with motor lubrication.

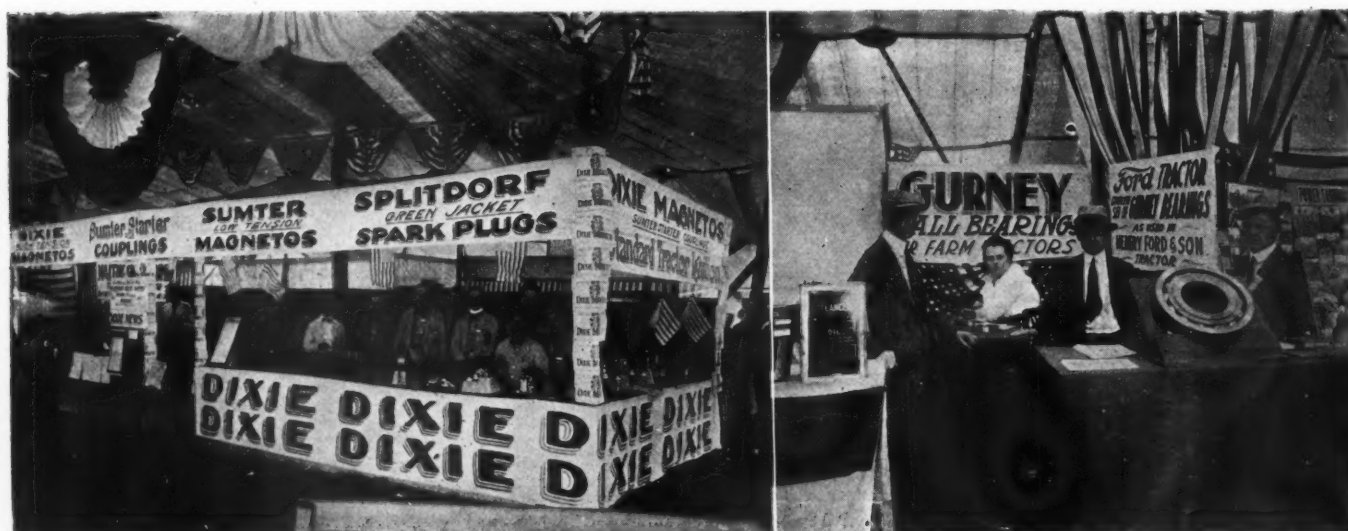
Perhaps an equally serious service problem is that of getting spare parts quickly to the farmer. To-day many tractor makers have not a complete circle of tractor dealers. One tractor is sold in a certain section, perhaps several hundred miles from a dealer. There is little opportunity for getting spares. One maker recommended that the S. A. E. foster some movement whereby tractor spare parts depots might be established in certain centers and each tractor firm desiring could arrange to have its spares handled through such depots, a plan that would insure farmers securing spares in short time and entirely independent of the agency situation. At present such a plan seems to meet with rather general approval in that the tractor dealer is not a definitely settled factor as yet. Many dealers take a tractor agency and sell one machine. If the machine fails to perform well, perhaps the agency is given up and the farmer finds himself with a tractor on hand and no dealer within several hundred miles. The depot system would bridge the present chaotic situation, chiefly with those concerns that have not their full circle of dealers, which means the majority of the tractor makers. Those makers with a full quota of dealers would not be in-

terested in such a plan of cooperation.

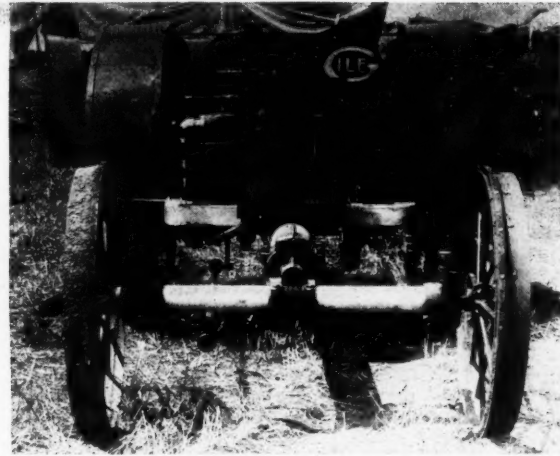
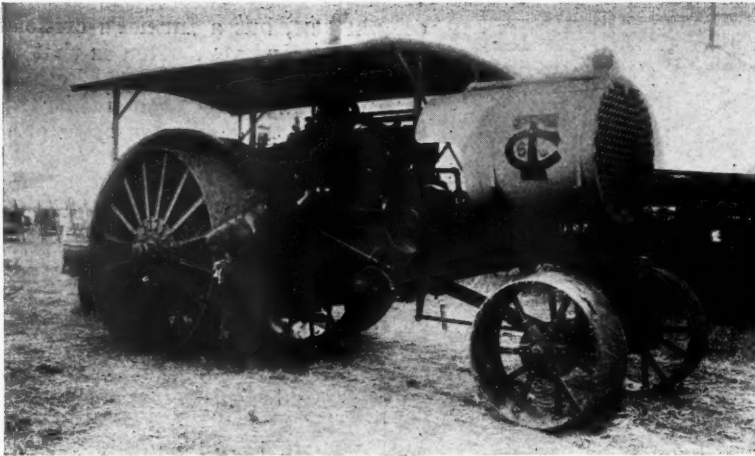
After the S. A. E. dinner W. G. Clark read a paper on kerosene, based upon his several years' experience as engineer to the Wilcox-Bennett Carbureter Company. His conclusions were that the engine and the carbureter or vaporizer must be integral, that it is not possible to make an engine burn kerosene by an attachment, whether it be a vaporizer only or both a vaporizer and a manifold. Mr. Clark considers that the kerosene problem is solved if the engine designers will supplement the work of the carbureter specialists. His paper describes in a very lucid manner how his company had tried various schemes and he itemized the faults and advantages of each different system. He stated that the great bulk of the vaporizers advertised are not capable of doing what is claimed for them, and that some restraint ought to be put upon untruthful assertions, for the ultimate good of the development.

The tractors exhibited were, as a whole, better machines than those gathered together at the demonstrations last year, but they are not much better. The advance in engineering has not been as great as it ought to have been. There are very few really excellent tractors, mostly made by firms who have been in the business a comparatively short time, though some of the older specialists on tractors such as the Wallis company, the Gray company and the Dauth company, to mention only three, have thoroughly sound machines. Some of the best designs are entirely new, such as the Velie and the Four Drive. The same as last year, the least advanced machines are the products of the biggest firms.

(Continued on page 279)



Many well-known parts manufacturers were represented in the accessory tents. The Splitdorf and Gurney booths shown above are typical of the style of arrangement. The ten men seen in the Splitdorf booth represent only a portion of the force which that firm had at the demonstrations



Left—Twin City 60-hp., the largest tractor at the Fremont show. This has a six-cylinder kerosene engine and is probably the most neatly designed of any large machine. Right—The small Gile; front axle rocks on the tube extending forward from underneath

1917 Tractor Development—I

Poorly Designed Tractors Still Predominate — Inclosed Gearing
Now the Rule—Accessibility Should Be Better—
More Four-Cylinder Engines

By A. Ludlow Clayden

ON the whole, since reviewing the engineering features of the tractors exhibited a year ago, there has been little change. To appreciate that change is taking place and to grasp the nature of that change it is necessary to do more than examine casually. The tractors exhibited at Fremont this year indicate the changes that are going to take place rather than demonstrate those which have happened. Furthermore, inquiry of many makers elicits the fact that they have new designs ready or nearly ready and it is impossible to escape the conviction that the absence from Fremont of several new jobs was due to fear of letting other manufacturers see them.

Speaking broadly, the tractors shown by the old implement firms are just as poorly designed as they were last year; they have not improved. The tractors shown by the large firms specializing on tractor making are a good deal better in detail, but still are generally fairly crude. Tractors made by smaller firms and especially by comparative newcomers to the business are infinitely better than the corresponding exhibits of 1916.

The regret expressed by many of the tractor engineers at the absence from Fremont of the Ford and General Motors tractors, together with other comments upon design, shows beyond

any question that the engineering branch of the purely tractor industry is looking to the automobile engineers to point the way forward. This represents a great change in outlook, because last year all the old line tractor men were deriding the automobile in-

Developments Shown at Fremont

- 1—Better inclosure and protection of gears
- 2—More four-cylinder engines of suitable type
- 3—Arrangements for kerosene burning improved
- 4—Control simplified, especially for steering

dust, saying tractor work was so different that automobile experience would be a hindrance rather than a help. Last year there were plenty of men ready to defend exposed gearing with cast gears, ready to prophesy the extinction of the motor truck type of engine and the ultimate triumph of the stationary gas engine variety. These men have either changed their opinions or are less ready to express them now.

To classify the improvements which are to be noted there are:

Better inclosure and protection of gearing and other parts.

More four cylinder engines built heavy enough for tractor service.

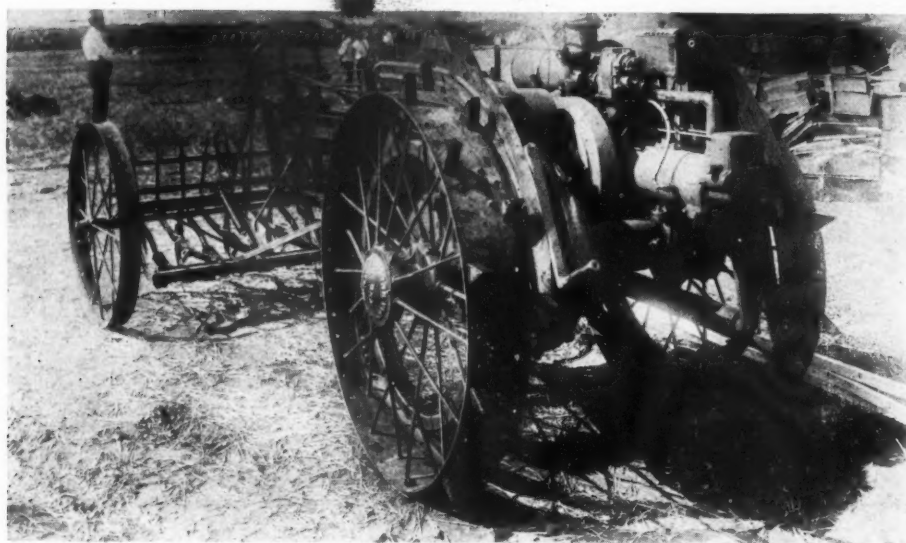
Better kerosene burning attachments.

Improved control, especially as to steering.

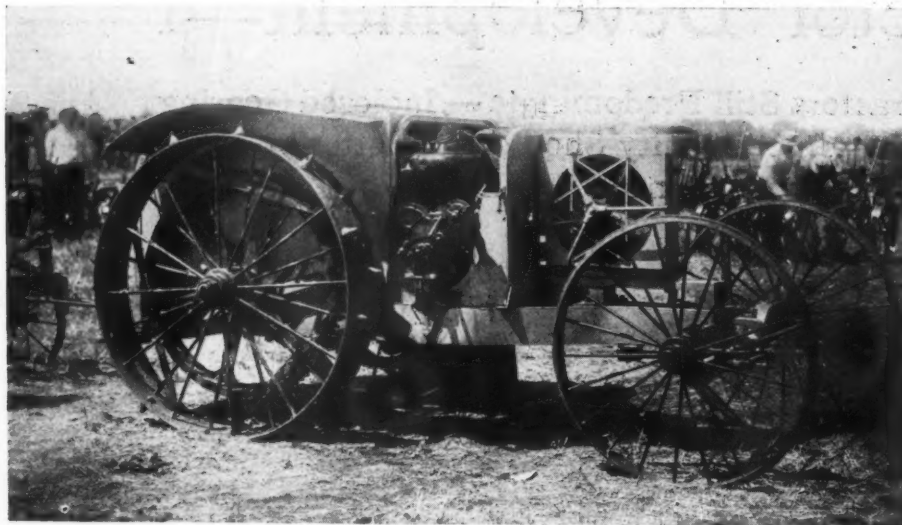
There may also be added an increasing tendency to make the tractor more adaptable for work other than plowing by means of new hitches, new wheel proportions and so on.

General Utility Machines

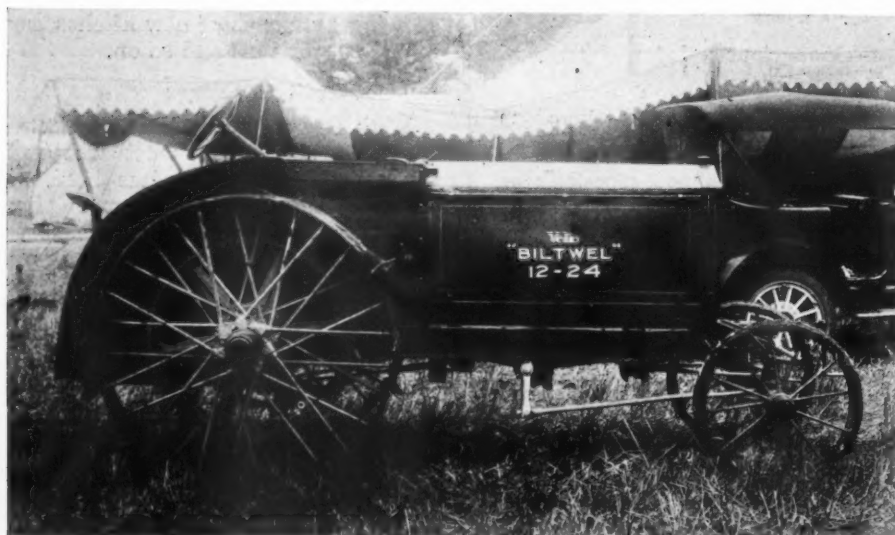
With respect to the last mentioned tendency, one of the most successful machines of the year has been the Moline Universal, a light power plant on two wheels, behind which may be attached a great variety of implements. It is so made that each implement plus the power plant makes a complete unit, for the operator sits on the implement, all the controls being brought back from the tractor to a convenient position. This reverses the usual order of things where the implement is placed awkwardly from the viewpoint of the tractor driver. The system would not be applicable to very large power plants, perhaps it might even not be desirable above a



The Moline Universal is considered a particularly useful tractor, owing to the way in which almost any implement can be made integral with it. The power plant consists of a two-cylinder opposed engine



The Parrett is particularly featured by its large front wheels, which are claimed to make it unusually easy to steer and to handle in bad conditions. There is a distinct tendency to increase the size of the front wheel's



The Velie tractor, which is a newcomer. This illustration was made from a machine from which the case inclosing the ring gear had been removed. Normally this gear runs in an oil bath

certain size, but a farmer's criticism which is heard very often is that the tractor is insufficiently adaptable. There are two ways to overcome this, one to do as the makers of the Moline, make the tractor in the relation of a mechanical horse which will bear much the same relation to the implement as does the animal, and the other is to redesign the implement. Arnold P. Yerkes, in his address at the S. A. E. dinner, made the statement that it seems fundamentally wrong to take rotary motion as provided by a tractor, to convert it into linear motion through the wheels and then back to rotary motion again by means of the wheels of the implement, for such machines as require rotary parts, like a reaper and binder. He asked would it not be better to make direct use of the rotary motion in the tractor and cut out the double conversion. Of course there is only one possible answer.

Pusher Suggested

Another suggestion made by Mr. Yerkes was that the possibility of using a tractor to push a new sort of reaper and binder in front of it ought to be worked out. Side attachments are clumsy and very awkward at corners; consequently the tractor operates much more slowly on this class of work than it really ought to do, which means that the cost of reaping by mechanical power is more than it need be.

All this, of course, is strictly up to the implement maker, but progress will undoubtedly be largely accelerated if the tractor engineers will come forward with suggestions. What really is happening is that the whole basis of farm work in the field is being changed. In the future we shall no more tow horse implements behind an engine than do we put a power unit between the shafts of a buggy to make an automobile. Nobody suggests that the tractor ought to walk on legs because it replaces a horse, and this would be just as reasonable as to expect unchanged horse implements to make the best use of mechanical power.

A fact which as yet does not seem to be properly appreciated is that farm implement design has been severely handicapped by having the horse as a power source. Had the tractor been available at the time when the more elaborate implements were being evolved they would have been very different from what they are to-day, and very much more efficient. Having to think always of the horse has limited the range of vision and restricted the imagination of the implement makers, but they are waking up to the tractor and the increased scope it gives them. It is not to be expected

that the awakening will be rapid, but ten years hence will show a complete upheaval in farm engineering, and the dawn of the new era is just breaking.

This means that the general design of tractors must change to accommodate that of the new implements which will come; meanwhile the two principal tasks which the tractor must perform are belt work and plowing. Belt work, in the opinion of Mr. Yerkes, represents 50 per cent of the total work of a tractor. For belt work to be thoroughly efficient the engine needs about the same power as is required for four plows, making the three and four plow outfits the best sizes for general utility on the farm; the two plow size is too small for most of the belt work that has to be done. In a word this indicates that the two plow tractor is to be thought of as a substitute for a couple of horses, perhaps for three horses, but its belt power is not seriously to be considered. The larger machine is not so much a horse substitute as it is an engine, with ability to do all sorts of things horses cannot perform.

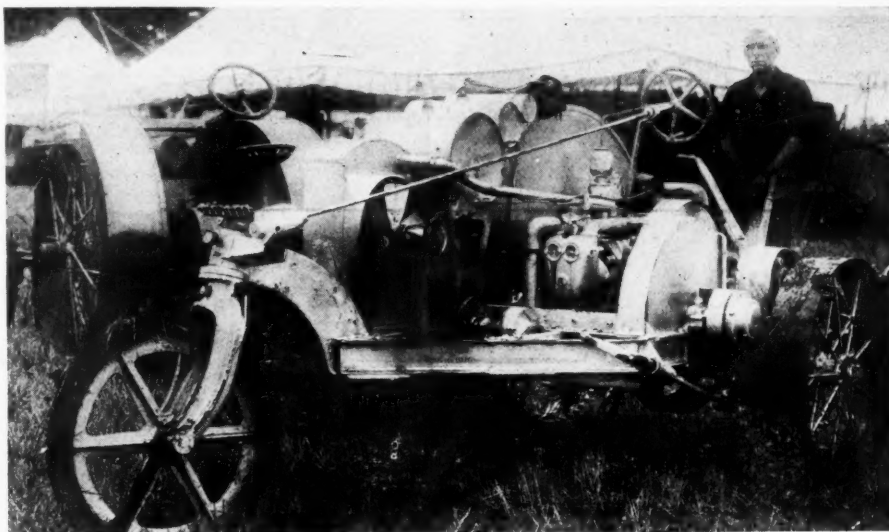
All this goes to show that the implement makers whose tractors are, as a rule, distinctly inferior in design and construction, would be wise to leave the provision of power to men better able to handle the matter and concentrate their energies upon the design of new implements. Getting the tractor right is only half the battle.

The world has never before seen any parallel case. It has never been necessary completely to alter the construction of an accepted machine to suit a newly available source of power. As a rule new machines come complete, but in this case the tractor is really only a portion of the many new machines that will come swiftly.

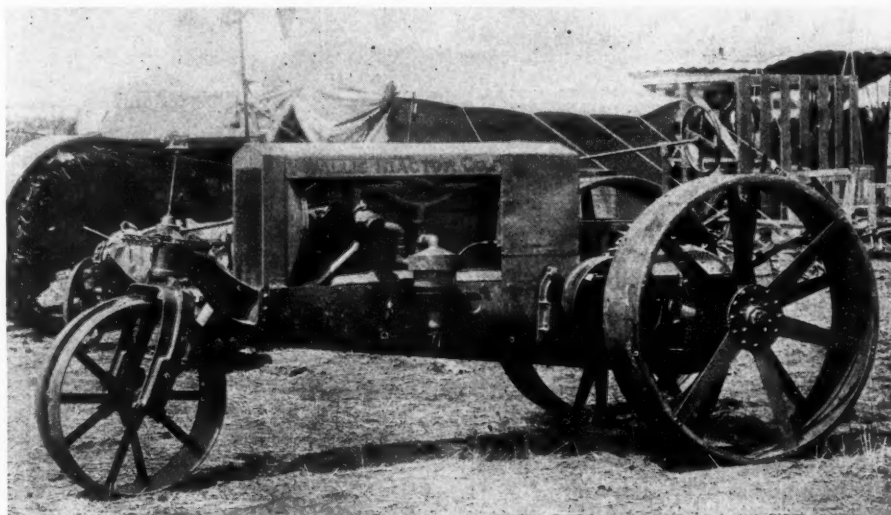
Transmission Improvements

Going back to the tabulated list of improvements, that of inclosure ranks first. While the inclosure pertains chiefly to the gearing, it also includes many other parts, but the transmissions are the most improved of all. There are several machines with well worked out cases inclosing the pinion and bull gear, there is an increasing number of tractors with axle drive and no ring gear, while well cut and hardened gearing is the rule.

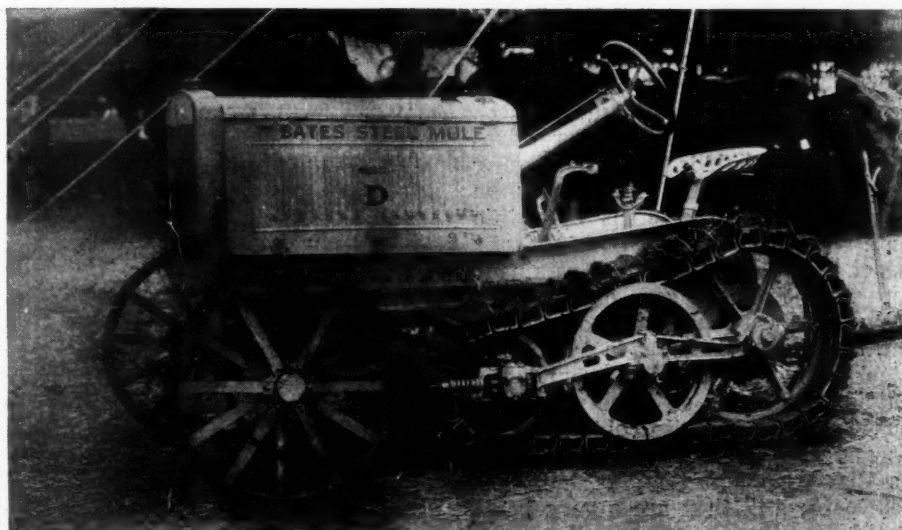
On several new machines a regular truck gearset is employed with three ratios, this being coupled to a jackshaft incorporating a constant large reduction through a pair of spur gears. More than one machine is using a worm gear ahead of the last spur train, so that the worm speed is the same as that of the crankshaft on high gear. A majority of machines



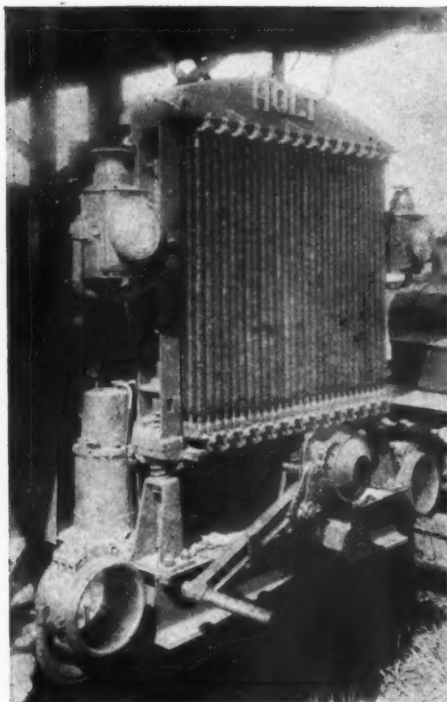
The Bull tractor, one of the few remaining machines with single wheel drive. This type of tractor usually has the front steering wheel in line with the wide faced rear driving wheel; the other rear wheel is an idler



The Wallis Junior in complete working trim except for lugs on the rear wheels. This is the most completely inclosed tractor and the simplest externally. It has a boiler plate under pan which forms part of the engine crankcase and gear case



A new model Bates steel mule. This is very much more compact than the old pattern and all parts are fully inclosed down to the creeper. There are two chains, one on each side, and they are connected flexibly to the frame of the machine

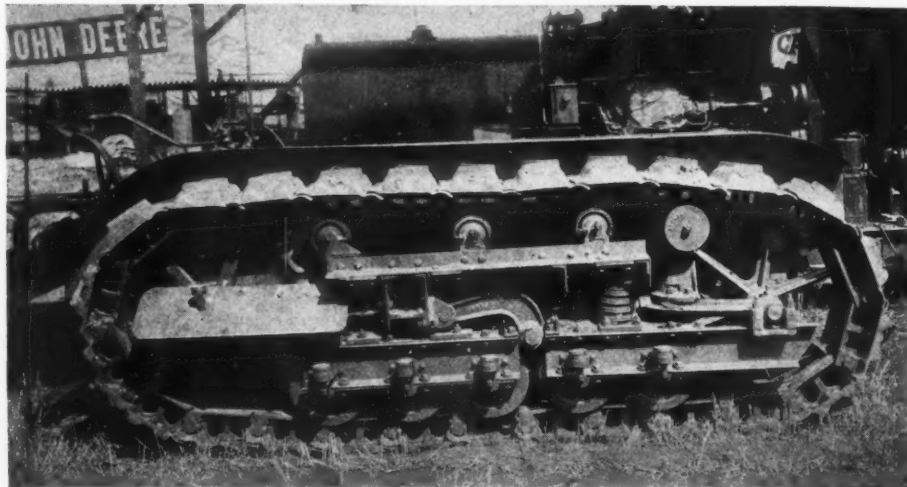


Radiator and lamp equipment on a Holt caterpillar intended for military service. Each of the radiator tube units is a separate piece held at top and bottom by clamps so that damaged tubes can be replaced very easily

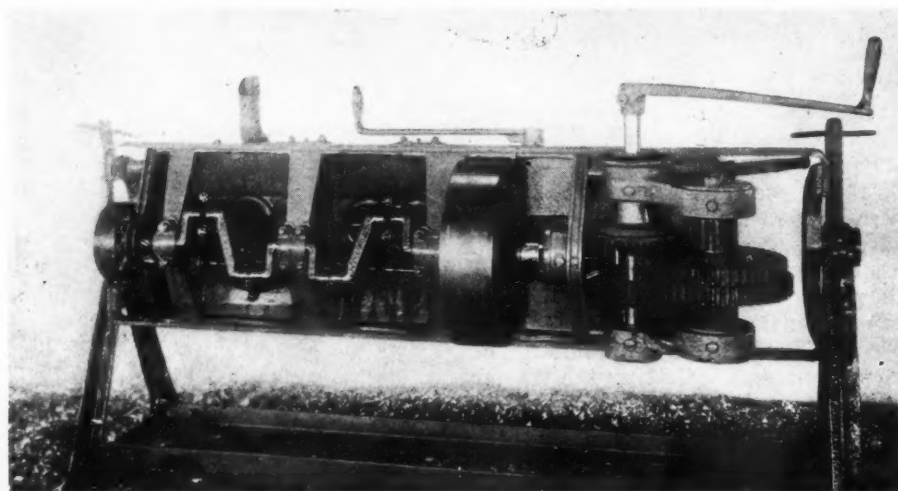
have roller or ball bearings throughout the transmission and are as fully lubricated as a truck. None the less the majority of machines still have the exposed bull gear; it is the minority which have managed to get away from it.

There are problems none too easy to solve in ring gear inclosure. Probably to make a thorough job of it it is necessary to mount the ring direct from the hub separate from the spokes of the wheel, this allowing the case to be divided at the centerline and thus able to retain oil in large quantity. This form of construction is adopted for the Velie tractor, and the case is, of course, stationary. An alternative is to continue to have the ring gear on the same spokes as the main wheel, in which case half the cover revolves and the other half is fixed, there being a clearance junction all around the periphery. With a stout case this makes a reasonably good job and one which will allow grease to be retained; an example of it is seen on the four-plow Twin City tractor, the case being cast iron. Cases made from sheet steel with the division around the outside are found on some machines, but it appears difficult to obtain a good fit and such cases are more valuable as dirt excluders than as lubricant retainers; still they are a very great deal better than no case at all.

There are two main divisions in what might be called "transmission scheme." In one there are two or



The track-laying portion of a 45-hp. Holt caterpillar. The rear sprocket transmits the drive pulling on the portion of the chain which is lying flat on the ground. Weight is carried by the five rollers seen on the under frame. This illustration is interesting comparatively with that on page 279



Under side of power plant of Wallis Junior. This includes the whole engine, clutch and transmission. The unit shown sets on the base which forms the frame of the tractor shown in another illustration

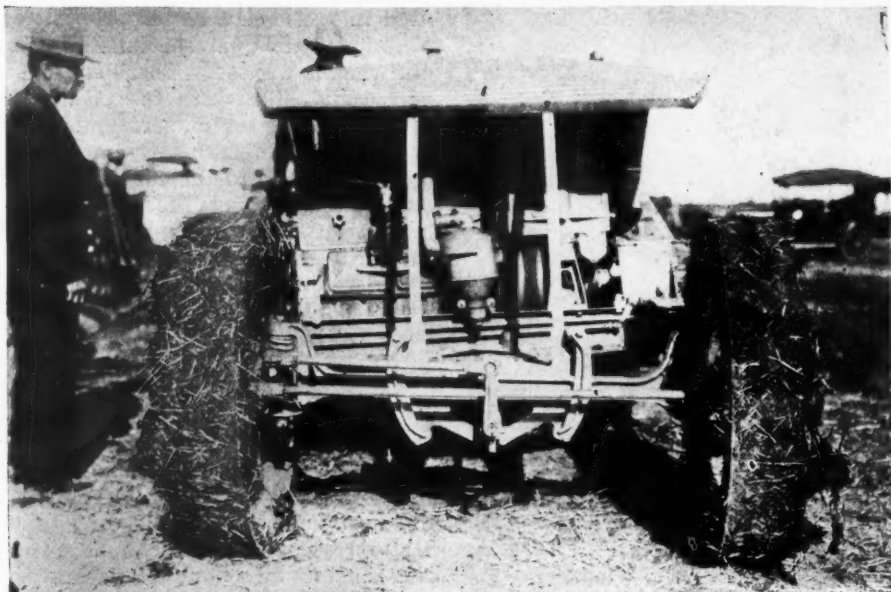
three forward speeds and a reverse, the general layout following automobile practice; in the other there are two or three speeds plus a reversing gear which allows the different ratios to be used either ahead or astern. The relative advantages are not easy to define, but briefly the greatest point in favor of the latter scheme seems to be the ability for maneuvering on high gear which is given. The former layout is the simpler, mechanically speaking, and requires fewer parts.

Peculiar Clutches

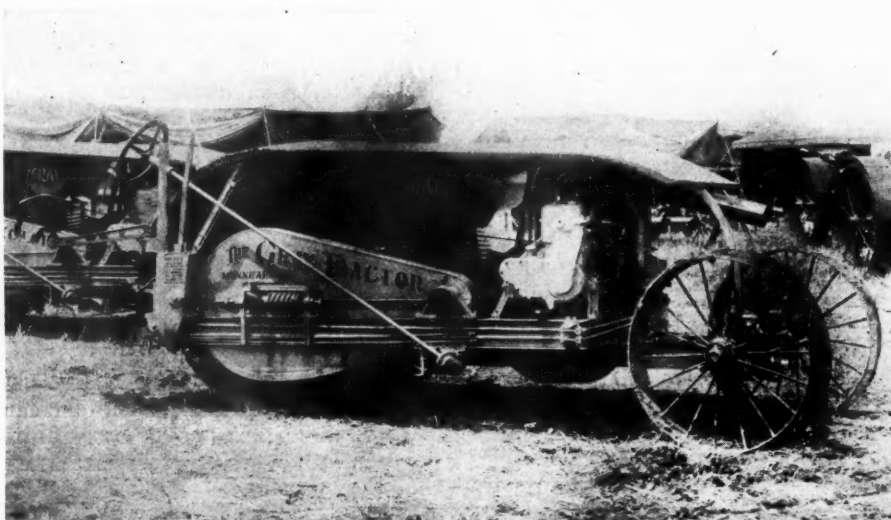
One of the most curious things about tractor design is the fondness shown for peculiar clutches. While the number of cone and disk clutches of the approved truck type is increasing, there is still a majority of expanding and band clutches having no possible advantage over the conventional sort and the outstanding disadvantage of an infinity of small parts with pin joints. They are not good

clutches and they cost more to make than the cone, while being at least as costly as the disk. Why they should be used is a complete mystery.

While there is no doubt as to the best sorts of clutch there is room for debate as to the best clutch control. This year there are more tractors with clutch pedals than before, but many still use the lever. Most of the pedal controls are supplied with hold-out catches, so that it is not necessary to shift gears in order to stop the tractor. Owing to the frequent stops necessary in field work, it seems desirable that some means for holding the clutch should be provided, and if this be admitted there is a good deal to be said in favor of the long hand lever over the pedal. Some of the ratchet catches seen on clutch pedals appeared to be insecure, and there is grave danger if the clutch is not held out in the most positive way possible. Suppose, for example, that the driver has put the clutch out and descended to attend to the implement, if the clutch



Front view of the Gray tractor, showing the connections which allow the front axle to rock independent of the frame

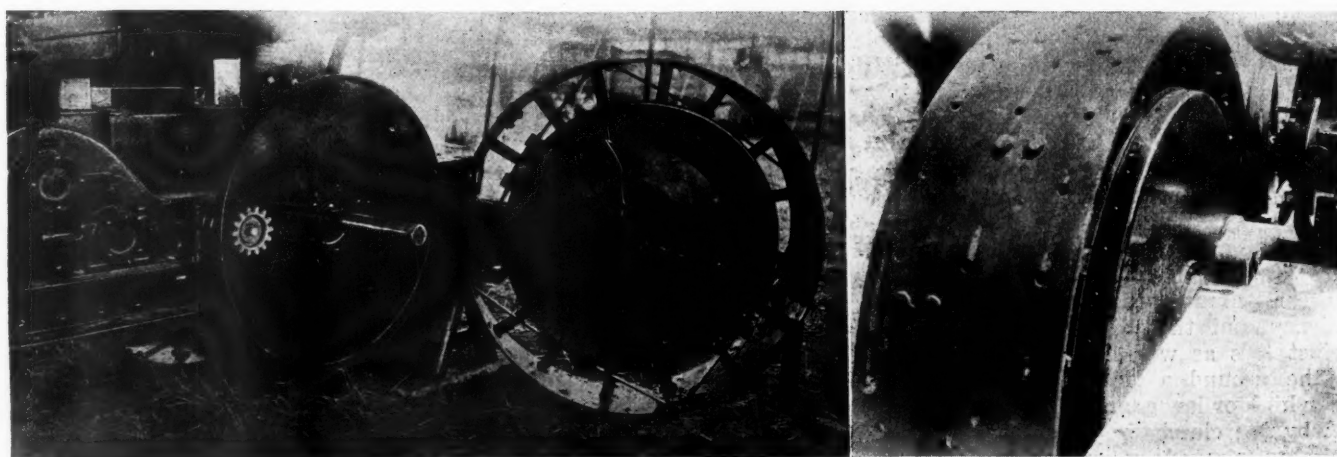


The Gray drum drive tractor has a single wide rear wheel driven by two chains. It is said to have a $6\frac{1}{2}$ lb. per sq. in. ground pressure and it has been specially designed for general utility in addition to plowing

engaged accidentally a serious accident would almost certainly result. It is not desirable that gears should be shifted every time the tractor stops, and it may be an advantage to be able to control the clutch while not in the driving seat, so altogether the hand lever control seems to have the balance in its favor.

Several machines using the nearest to automobile type transmission had conventional unit power plant construction, the clutch being inclosed in a bell housing. While this gives complete protection to the clutch it may be doubted if it is really good practice. For an automobile the bell housing is a manufacturing advantage, and the inaccessibility of the clutch which results is permissible because an automobile clutch only needs relining at rare intervals. On a tractor the clutch has a great deal more work to do than on any road vehicle and the farmer should be able to reline it himself. Now a unit power plant construction of tractor size requires a powerful hoist and a lot of tackle to take down. To reline a clutch in a unit power plant tractor would take days with unskilled labor to do the job. Thus it seems that it ought to be possible to remove the wearing portions of the clutch without disturbing other parts. Owing to the necessity for removing clutch surfaces at fairly frequent intervals there should be an excellent opportunity for standardization of disks or cone lining. It ought not to be difficult for tractor builders to agree upon standard sizes for disks or cones, and it would allow linings to be made readily available to every farmer. Also if any manufacturers wish to adhere to their strange expanding or band contraptions, let them see to it that the lining used is some standard S.A.E. size.

Leaving out of consideration the poor machines, and considering only



The inclosed final drive of the Twin City four-plow machine is an excellent example of the development which is taking place. This case is carefully machined and is claimed to be a sufficiently tight fit at the junction to allow the retention of grease. A plug accessible from outside the wheel allows fresh lubricant to be inserted



A peculiar form of drive used on the Nilson. All three wheels, the wide one and the two narrow ones, are solid on the same axle. There is no differential action between the two outer wheels

those which represent real engineering, we see two methods of arrangement. In the one most common to the better tractors the engine is set longitudinally as in a truck, next comes the clutch and the gears for providing the different ratios, and then the last gear train and final drive.

In the other scheme the engine is set transversely and the drive all the way is through spur gears, no bevels or worms being required. The former layout appears to the automobile engineer to be the easier to design, but the latter has certain things in its favor. It must be remembered that it was the limited width available which caused the automobile and truck engine to assume the conventional position, and on a tractor there is plenty of room to put the four-cylinder motor transversely in the frame. It is easy to provide a two-speed and reverse gear combination and to drive a jackshaft with the minimum total number of gears. It is not so easy to get an axle drive.

With the transverse engine it is easy to get a good position for the belt pulley and a drive without any gears running, in other words a drive of the maximum possible mechanical efficiency, but there is an argument against this as well as in its favor. On the ground a tractor is put in either high or low gear and then operated by the clutch, it is not possible to shift gears as in a truck, but if the belt pulley is back of the transmission it is possible to pick up belt load auto-

mobile fashion. Suppose a machine requires to be driven at fairly high speed and that the engine driving direct on the pulley has not power enough to start the machine. Then by engaging the low gear and driving the pulley at a lower speed a start may be obtainable. Once the machine is running it will gain momentum, and it may easily be possible to declutch, shift to high gear, and re clutch after the machine is started. Just what value this feature has is debatable.

Returning to transmissions proper, there is small doubt that their manufacture is going into the hands of the parts makers before long, just as engine making has already gone to specialists. On some tractors the heaviest stock truck transmissions are being used, but these are not fully suitable because they are designed with the idea that most of the running, probably 80 per cent, will be done on direct high speed. This is not true of tractors; in fact, if there be a direct speed in the gearset it should be the low rather than the high gear. On the whole it is doubtful if the automobile layout is really suitable for tractor work. Having regard to the large total gear reduction necessary the value of any direct speed may be questioned. What is the result of it? Merely that on one speed we have no gears in operation, while on other speeds the power goes from main to counter shaft and back again through two sets of gears. To have all speeds indirect, and each speed

such that only one pair of gears is used in it seems a better proposition. It is up to the gear specialists to find out what is wanted. There is a great opportunity for them to consult the progressive tractor makers and to get out some stock transmissions. Why not put this up to the committee that has been handling the standardized truck transmissions so ably? Not with the idea of producing standardized transmissions just yet, but to find out what the better grade tractor engineers really want and to discuss different layouts for providing it.

There is no question but that the progressive tractor men would welcome assistance from parts makers in this way. The bearing makers, especially Hyatt, have been giving very real assistance in their field. Timken is supplying worm gears to more than one tractor firm, and radiators and wheels are coming from other sources. In laying out transmissions there seems to be one thing in particular that should be standardized, and this is the rear end of the case. Probably a good stock transmission would be required to hook up to all sorts of axles and jackshafts, thus a standard ring of studs or bolt holes in the rear end of the transmission case should be desirable. Also it would be an excellent idea to agree upon some definite dimensions for the shaft ends, because this would help other manufacturers to standardize parts adjacent to the transmission—axles, jackshafts, universal joints, etc.

The method of suspending or attaching the transmission is not so important, since the tractor builder can care for this as long as his stock units fit each other. Nor is it necessary that the overall dimensions be similar between one make of transmission and another; the time is not yet ripe for much limitation to be placed upon the designer. One gearset might be twice the length or the diameter of another as long as its front and rear attachments suited a standard which could be followed by other parts makers. Totally different automobile gearsets have the same bell housing and the same S.A.E. taper on the end of the drive shaft for the universal joint. They are not interchangeable without alteration to the propeller shaft and the control levers, etc., but they allow the engine builders to use the stock bell housing and the joint makers to produce standard universals. In the automobile world the standards came long after the stock parts were in common use, but in the tractor field the standards should come first. If they do so appear it will save an inestimable sum of money to both tractor makers and tractor users.

(To be continued)

Tractor Service Largely Educational*

Manufacturers Must Teach Farmers To Think of
Machines in Terms of Tractor Energy—Should Take
Lessons from Experiences of Automobile Builders

By Dent Parrett

President Parrett Tractor Co., Chicago, Ill.

WITH our country at war, it is important that all methods of crop production reach a high state of efficiency. The farm tractor is the only solution to the demand for more power and increasing scarcity of farm labor. The progress in tractor development is increasing the usefulness of tractors each year.

There are so many angles to the service problem that it is not possible to consider them all at this time. Certainly one of the most important points to bring out is the correct understanding of what is meant by the word service. From past experience it seems that the average purchaser thinks the word "service" means "something for nothing," when, in reality, it means giving the customer what he wants and needs in the quickest possible time, at the lowest possible cost.

We, in the tractor business, are really selling power to a farmer very much as a large public service company sells electric current. The tractor is the medium whereby we deliver this power. In selling tractors, if we cannot accept the obligation of furnishing correct information for using them, and adequate organization for distributing repair parts, we are not fulfilling our real function in the tractor business.

Quick results can be secured by more intelligent operation of tractors already in use and now being manufactured. A large percentage of tractors are doing good work, but all would render even better service if properly operated and cared for.

The technical and farm press have accomplished much in telling farmers how to plan the work of their tractors, showing the importance of proper care and operation, and teaching the farmer to show the right spirit toward the machine. Stories of experiences in power farming can be made interesting reading, and offer an excellent means of teaching the farmer that his success with a tractor largely depends on his own efforts.

Thinking in Tractor Terms

The greatest present need is to educate the tractor owner to have the proper attitude toward his machine, and to feel his responsibility. *He should be taught to think of the tractor in terms of tractor energy. He should realize that overloading and lack of proper care will result in less reliable service and in repair expense.*

A good example is found in the experience of an intelligent and progressive farmer. He owned an automobile for several years, so, when he bought a tractor, was confident he could take care of it properly. On the third day he telephoned for help. The service man sent to his assistance found the engine without oil. The owner said his automobile needed oil only once a week, and thought that often enough to put oil in a tractor. Fortunately, the damage was slight, and was very quickly repaired. He was then told that the manufacturer could build the tractor, but could not run it for him; he must do that for himself. This farmer learned two important lessons from this experience: To think in tractor terms and to realize his own responsibility.

Many purchasers and operators do not read the printed instructions. Owners who have the right attitude read instructions carefully, and refer to them in case of trouble. For the many who do not, some simple plan should be worked out to

induce them to read the instruction book. The following plan was suggested, and is surely worthy of consideration:

Send out advice on care and operation in bulletin form, a part of which is detachable, to be paid out and returned to the factory. If it is not returned, the guarantee would cease automatically.

Prompt repair service should be a goal for every manufacturer. If the factory has the right viewpoint toward service, the whole organization will get the spirit of helping the tractor "do its bit." Repair stocks should be located so that any owner could get parts within twenty-four hours by express. This will save the loss of much valuable time, and build up public confidence in power farming.

Prompt Service Examples

Considerable progress has been made toward standardization by individual manufacturers, with the result that repairs are made more easily and with less loss of time. When the tractor owner can install repair parts without considerable fitting, his good-will toward the machine increases. I want to give the following examples of what prompt and efficient service has done for the tractor owners:

(1) One of the big troubles is that most owners have not learned to think of field work in terms of tractor energy. One owner will expect entirely too much, and another will expect less than the tractor is really able to do.

A farmer had been plowing with horses on some very wet land, and getting along fairly well. He purchased a tractor and tried to go out at once and plow on this same land. This farmer had the idea that, because the tractor was delivered to him in good shape, he should be able to run it day after day without a single adjustment, and have it continue to work perfectly. The service man pressed upon the farmer that he must necessarily learn the adjustments of the tractor himself if he expected the best service from it. He also succeeded in getting the farmer to think of the tractor in terms different from those he used when thinking of horses.

(2) In many cases salesmen make extravagant claims as to the work the tractor can do. Very often this leads the new owner to expect entirely too much from his machine.

A dealer sold a tractor on a guarantee that it would pull its regular number of plows ten inches deep. The tractor was delivered at a time when the ground was very hard and dry, still the expert made the tractor do what was claimed by the salesman. This farmer had purchased it with the understanding that it would pull the plows ten inches deep, and he wanted to continue plowing at that depth. Furthermore, he expected the machine to do this work without care and attention on his part. The service man explained to this owner what he might expect from the tractor, and emphasized very strongly the duties of the operator.

The customer was brought to realize that his responsibility was as great as that of the manufacturer. He at once took a greater interest in his machine, and soon learned how to operate it better, and to-day this man is a tractor enthusiast.

(3) We usually expect more from the young fellow who has attended an agricultural college. However, here is an example of a graduate of one of our best agricultural schools, who had trouble with his machine. The tractor was shipped to him in the late winter before it was possible to try it out in actual field operation. The expert making the delivery gave all the information he could in regard to the care and operation of the machine. He left feeling satisfied that this new owner could get along all right.

*Paper read before the Tractor Meeting of the Society of Automotive Engineers at Fremont, Neb., Aug. 9.

As soon as spring work started this young fellow called for help. He was not getting along with his tractor—he did not consider it practical for spring work, and expressed his great disappointment in the purchase. The service man was sent at once, and spent several days showing the owner how to operate the machine, and what could be done with it. Since that time this young man has written several letters expressing his entire satisfaction with the tractor.

Teaching the Farmer

The manufacturer's service department should be organized with the main object of teaching the farmer to help himself. It is very important that new tractors be started off in the right way. The operator should be taught how to care properly for the machine, and should be told the advantage of operating it within its capacity, instead of attempting to overload it.

The first step toward securing the purchaser's good-will is that the tractor be sold on conservative claims. If he then receives the proper instructions, the new owner will be well started on the road to efficient tractor service.

The engine, transmission and other working parts will

last longer if a new tractor pulls a light load for the first two or three days. Too often the new plowing outfit is put on the toughest piece of ground on the farm in order to try it out. Automobile manufacturers of long experience are sending out instructions with new cars to the effect that they should not be driven faster than 20 or 25 m.p.h. for the first few hundred miles. Tractor manufacturers and owners should take the lesson.

Get Service Habit

The operator should have a regular plan for oiling and caring for the tractor. Even though this work takes one-half hour from each working day, it must be done regularly, and will result in more reliable and efficient service.

Keeping in mind the viewpoint of better service from present tractors, we have laid special emphasis on the farmer's duties in operating farm power equipment. I believe the established tractor manufacturers are fully conscious of their great responsibility in producing more efficient tractors, and in greater numbers. With the farmer and the manufacturer each doing his full share, the resultant tractor service will go far toward solving the nation's food problem.

Tractor Makers Must Carry Service to the Farmer

By H. C. Buffington

Motor Engineer, Minneapolis Steel & Machinery Co.

WITHOUT exaggeration, I believe 25 per cent of the tractors stand idle during the busy seasons, whereas they could be doing profitable work. There are, perhaps, 25 per cent more that could be doing profitable work, but are inefficient because of the operator's inability to properly handle them; another 25 per cent not producing satisfactory results owing to lack of repairs, supplies, etc. If this is so, only 25 per cent of the tractors are efficient.

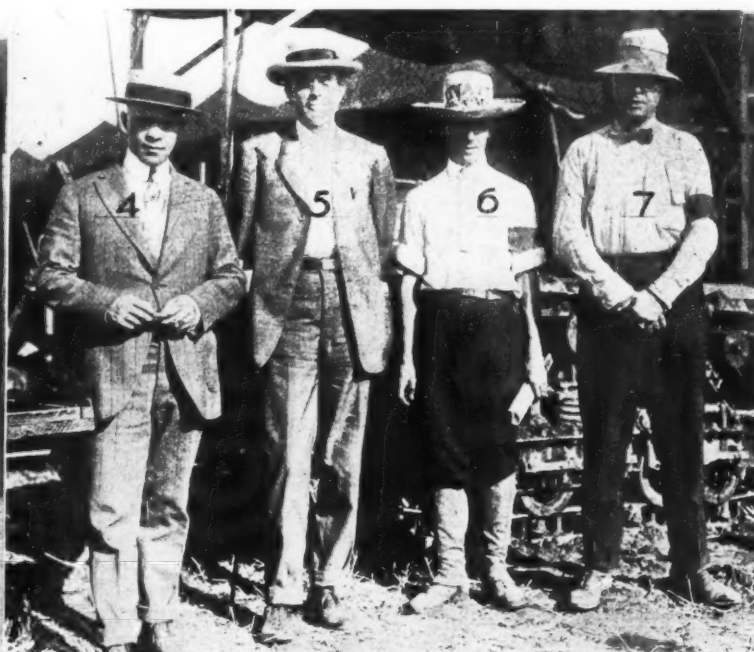
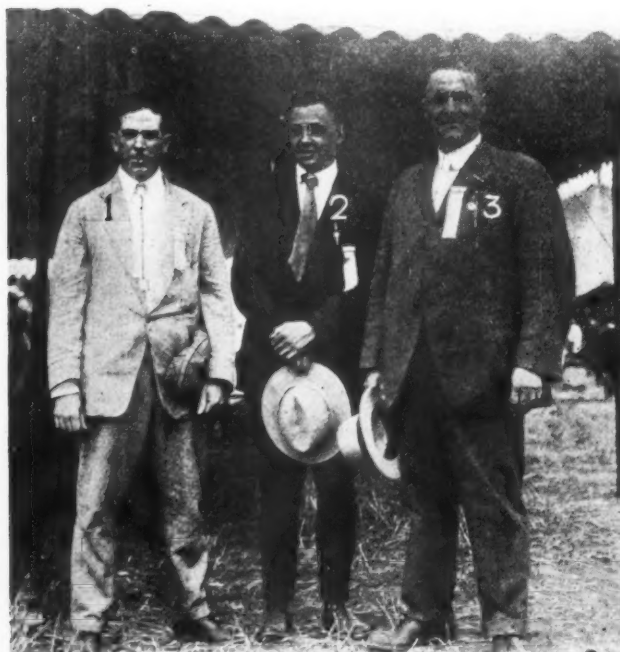
The task then is to improve this condition so that all the tractors will give continuous, satisfactory, and profitable service.

Education, of course, sounds good, and is good. It can be carried on in a great many ways, through instruction books issued by the tractor manufacturers and universities (but the farmer seldom has time to read these), or through large tractor schools. But this is only a beginning. What we want is action now, and not efforts which will produce results two or three years hence.

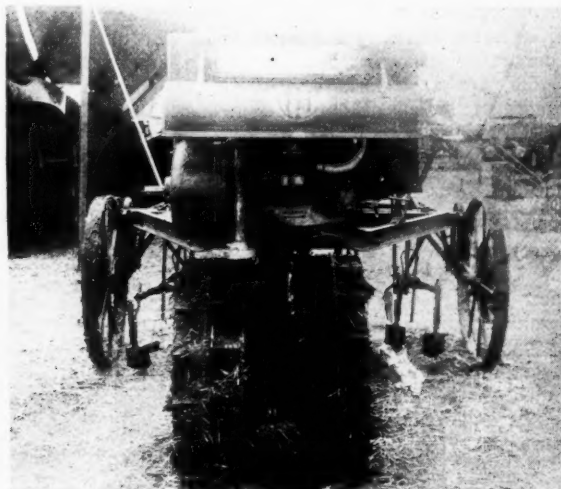
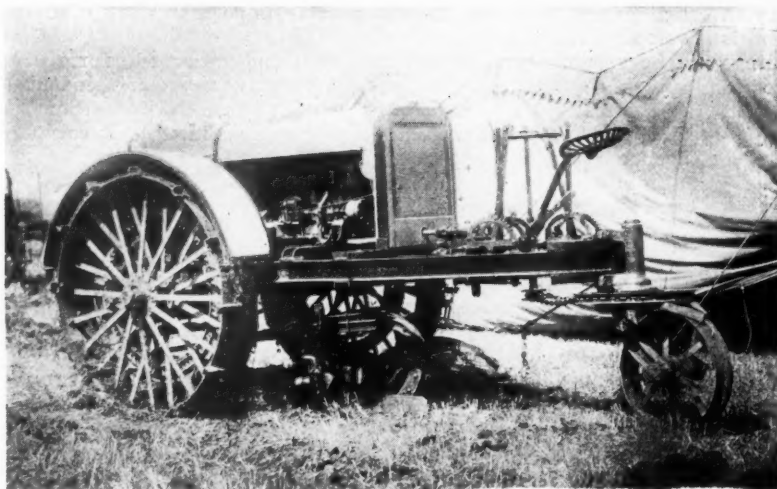
We need a system that will carry tractor service, or, better yet, tractor efficiency, to the farmer's door, and not rely upon his coming to us.

We are making a great deal of fuss about the conservation of our food supply. Why not make more of a fuss about increasing the food supply? We have thousands of tractors, and thousands of square miles of fertile land. I believe there is one way of taking care of this problem, and that is for the government to have a hand in the situation.

In order to work out the system, let us take one State, North Dakota, for an example, and create a new department. Call it the "Department of Tractor Service," for convenience, with headquarters at Bismarck. Then let us locate sub-quarters, all being geographically situated to cover the State effectually. Say, for example, Minot for the northwest, Devil's Lake for the northeast, Dickinson for the southwest, and Fargo for the southeast. Next, employ expert field men, and assign them to certain territories.



Three Atlas tractor men: 1—F. P. Steel, sales manager. 2—J. B. Wiles, assistant sales manager. 3—C. E. Sargent, general manager. At the right are: 4—H. B. Baker. 5—William Turnbull. 6—H. W. Chown. 7—H. P. Smith



Left—Very few tractors are arranged to carry the plows underneath the frame of the machine. The Allbaugh-Dover shown above is one example of this type. The two front wheels are driven independently by friction and allow the machine to turn in its own length. Right—International Harvester motor cultivator. This is an entirely new machine driven by a small Le Roy four-cylinder engine. Drive goes down a vertical shaft to the twin wheels and the control allows the machine to be swiveled in practically any direction

The far-reaching scope and power of a body of men such as might be organized under this plan can hardly be realized until we go over a few of the items that can be gathered.

First—The department would have an exact record of all tractors in the State.

Second—The department would know just when a tractor is standing idle.

Third—The department would have a record of farmers holding undeveloped land, land to break or seed, crops to harvest, such as the season, of course, would determine.

Fourth—The department would know the exact date on which a tractor is shipped from the factory, which road it will go over, and to whom it will be shipped.

Fifth—It would be a part of the department's duties to know why the supplies of fuel, oil, or repair parts are not taken care of promptly.

As can readily be seen, there is no limit to the possibilities of such a department's service under this system. All the work of gathering the necessary information can be accomplished without waste of time and space.

Cash Sales Essential Before Service Can Be Satisfactory

By L. B. Duntley

Manager Service Department, Emerson-Brantingham Co.

IT will not be possible to give the tractor purchaser satisfactory tractor service until such time as tractors are sold to the ultimate purchaser for cash on delivery. This may apply more particularly to tractors selling for \$2,000, or less, but the majority of tractors now sold are under \$2,000, so let us deal with the majority.

The reason for this is found in the difference in the mental attitude of the tractor purchaser who pays cash and the one who pays on time. The difference is simply this: The cash purchaser owns the tractor from the start and quite naturally takes greater interest in it, with a greater desire to learn all there is to know about its operation and care than the purchaser who does not own the tractor until it is fully paid for. Until tractors are sold to the purchaser for cash on delivery entirely tractor companies will be attempting to give service to two classes of purchasers who are not on an equal footing.

The object in organizing a service department is to group all activities pertaining to the welfare of the product after it is sold in such a manner that everyone concerned with that product will derive the greatest possible benefit. It will be more possible to organize the Service Department and gain that objective when the tractor companies have only one class of purchasers with which to deal.

Tractor Service vs. Automobile Service

The automobile companies that are giving service to car owners have a definitely organized plan of operation, and they are really doing some splendid things for the people who own cars. They have service stations established at their factory sales branches, where a car owner can take his car and have minor adjustments made. All car owners are on an equal footing, and how much better off they are as a result of that equality. When this principle is applied to

tractor service it will be given without any strings to it, and with no ulterior motives. The tractor owner is the one who will benefit most by such a system. He will be much better off and tractor service will be organized for service alone.

It will be impossible for tractor companies to organize service as it is organized by automobile companies; the car owner can take his car to a service station for repairs and inspection, but tractor service must be taken to the tractor in the field. It is seldom necessary for an automobile company to send a service man to a car located any great distance from a service station, because the local garage man will take care of the trouble. Not so with the tractor owner. Sometimes the garage man in the nearest town will be called upon for assistance, but the owner usually prefers to have a company man fix his tractor. This necessitates tractor companies working on an entirely different plan.

It is absolutely essential that tractor companies maintain service stations at centrally located points for the distribution of repair parts, but, in addition to that, they must maintain a corps of service men to visit the tractors. Tractor service stations are usually located at factory sales branches, if the company maintains such branches, or they may be established with a local distributor. These branches, however, are usually merely repair depots in so far as service is concerned.

Referring to the organization chart, it will be noted that there is a superintendent of service at the head of the service organization and pertaining to service. He is located at the factory, and is independent of the sales organization. Here is where the tractor service department will differ from some automobile service departments. Many of the latter are operated in conjunction with the sales department, for, with their system of sales and service stations combined, one manager, with assistants, works out very well. In tractor

service, where a force of field service men is necessary, a department entirely separate from the sales department is almost sure to work out best, for there are so many things to combine with field service for the betterment of the industry as a whole that the burden of it all would be more than the sales department should bear if it is expected that justice to both sales and service will be done.

Return Goods

By return goods are meant all parts returned to the factory for credit in lieu of the warranty and parts returned to be repaired and returned to the customer. This inspection could easily be taken care of by a regular factory inspector, and would not necessarily absorb all of his time. After this inspection, the written report of the inspector goes to the service department, and the claim is either allowed or rejected. Settlement of all other claims for non-performance, according to the warranty after the machine is delivered, will come under the service department.

All shipments of repair parts, records of repair stock, maintenance of repair stocks at factory and repair depots, invoicing and other routing work, comes rightfully under the service department. The fact that the service department is so closely in touch with the tractor owner at all times, and is so familiar with the work the machine is doing, its requirements and methods of repairing in the field, is the reason for its handling all this work.

Correspondence

Service department correspondence will consist of instructions to field men, their routing, etc.; repair orders and correspondence incident thereto; letters to tractor owners regarding difficulties in operation of the machines; recommendations on care and operation, and on how to make repairs, and owners' bulletins pertaining to care and operation. This latter should constitute a part of a campaign to educate tractor owners as to the correct methods of care and operation, and should consist of reliable information in plain language, which can be readily understood by persons not familiar with mechanics and technical terms.

Records

It is essential to the welfare of the business as a whole that an accurate record be kept of to whom each tractor is sold, the serial number thereof, the purchaser's postoffice address, his shipping point, and the dates of shipment and delivery of the tractor. A record of this kind greatly assists in the shipment of repair parts to the proper address, as well as in the directing of mail. It will also enable companies to circularize all of their tractor owners on any subject, and especially will help in the campaign of education.

All complaints on the product, classified and recorded in such a manner as to insure their receiving attention, will constitute a record of inestimable value to the engineering

and production departments in their important work of developing the product.

Service reports, carefully filled and recorded, form a valuable record, as, through this record, the superintendent of service can keep himself posted on actual field conditions, and thus be in better position to carry on intelligent correspondence with the tractor owner.

Records of test on machines before delivery should be kept on file in the service department.

Education

All instruction books and other publications pertaining to the care and operation of tractors should be edited by the superintendent of service and published through his department. The instruction book should be in clear, concise language, and well illustrated with pictures and sketches, which will make the descriptive matter more easily understood. If the instruction book is made attractive and is written in an interesting manner, the tractor owner will study it and get something out of it. It should contain clear-cut recommendations, put forth in a forceful manner, and be a store of reliable information for the tractor owner. It should be arranged for ready reference, and of a size convenient to carry about, if desired.

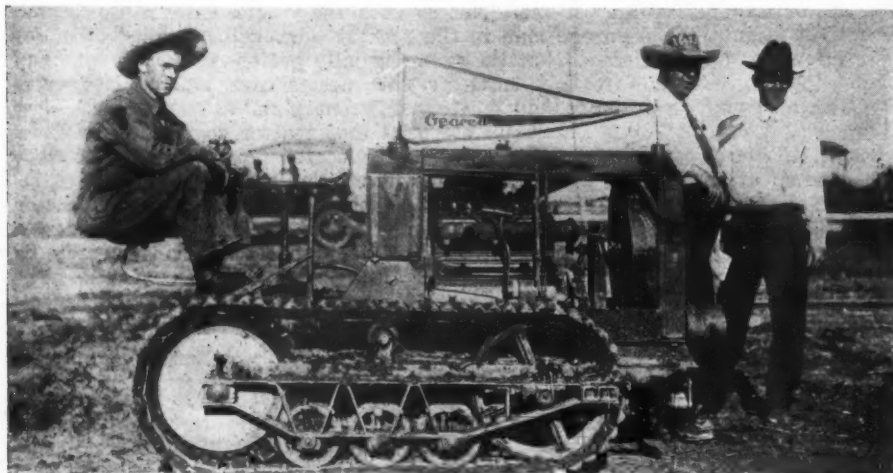
The repair price list should be compiled by a person directly in charge of the repair end of the business. This list should contain the name of every part on the tractor, the pattern number and name, and should be so indexed and classified both numerically and alphabetically as to permit of finding any part readily. Each part should be illustrated, and, when possible, shown in its position on the tractor. The tractor owner will know a part by its picture and location on the tractor when he may not know it by name.

In listing gears, it is well to state the number of teeth, and the sizes of belts, cap screws, spark plugs, studs, etc., should all be given. In fact, any details of description that will help to identify the part will be helpful.

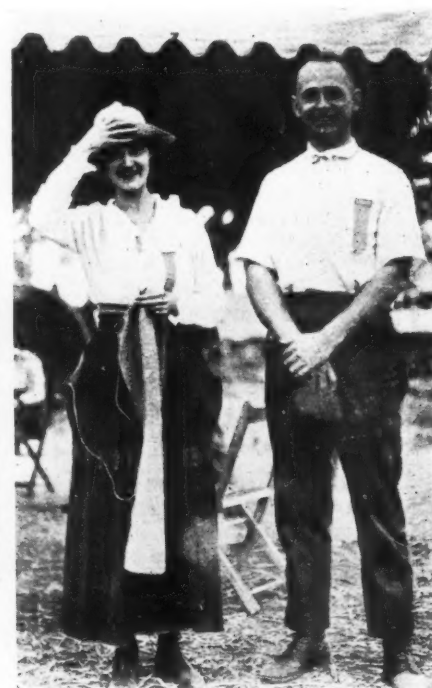
A properly compiled repair price list will so aid a tractor owner in intelligently ordering repairs as to practically eliminate mistakes.

Some companies operate schools for the benefit of their customers and their own service men. These schools should certainly be under the direction of the service department.

A very important work, which can best be carried on through the service department, is the improvement of the tractor through a careful study of conditions in the field. The service department will be able to bring before the engineering and production department the shortcomings of the tractor better than any other department, and its recommenda-



The Cleveland creeper type, a machine which is being very much sought after for export to Europe. Its small size and great maneuvering ability are particular features. At the right are Mr. and Mrs. Dent Parrett, who are apparently enjoying the demonstrations



tions for the betterment of the product are certain to be very valuable.

A fully equipped repair shop, located at the factory for the repairing of tractor units, or even complete machines and making the minor repairs on accessories, would be a great asset to the department.

Real service is the kind that is unsolicited. A service inspector covering one general territory can visit a tractor owner, look his tractor over, advise the operator in regard to its care and operation, and make minor adjustments. This inspector, constantly circulating among all of the tractors in his territory, can do a vast amount of good if he can see things on a tractor which need attention, and which are overlooked by the operator. He should be a trained man of good personality, with a keen eye for the details of care and operation of a tractor. The trouble which he will be able to head off will save many trips for field service men and many disputes over claims on broken parts.

The duty of the field service man is to take care of the repairing of the machines in the field. If a tractor owner calls for service, a field service man goes out and puts the machine in running order. During the rush season, when tractors must be delivered to the purchaser, the sales department can requisition field service men from the service department to make these deliveries. While making deliveries they should be considered a part of the sales department, for a sale is not completed until the delivery is made.

The sales department sells the tractors, but the service department must keep them sold by giving the tractor owner satisfactory service at the time it is needed.

These stations, so far as the service department is concerned, are merely repair depots and headquarters for the field men. It would probably be most practical to arrange for the actual routing of all field men by some individual located at the service station. It will be necessary to have an intelligent man at each service station to take care of repairs and other miscellaneous matters pertaining to service, so that the work of routing the men would probably fall on him.

The field service man, to be a good one, must be a trained mechanic, with a natural ability to find trouble and remedy

it. Working as he does, almost wholly on his own resources, he must be conscientious and thorough in his work. His personality must be pleasing, and he must be diplomatic. In fact, he must be a high-class man. Some tractor owners have had some very unsatisfactory experience with service men who were unfitted for that class of work, and a great many of them have become very skeptical on this subject. Tractor companies, therefore, should select their field men very carefully. They undoubtedly will be forced to train men especially for this class of work.

One of the greatest services a company can render a tractor purchaser is to send a man at the time of delivery of his tractor who can instruct him in the correct care and operation of the tractor and leave him understanding all of the vital matters pertaining to the care and operation of the machine. If the purchaser is started right, he invariably gets along without trouble.

The field service man must know the system thoroughly under which his company is giving service, and must guard himself against loose talk which might lead the purchaser to believe that he is entitled to many things which he is not.

He should be able to render complete and intelligent reports on everything which he does in connection with his work, and thus assist in that important work of developing the tractor in the field. This does not mean that he must be an inventor or a designer. The fellow who thinks he is an inventor or a designer does not, as a rule, make a good service man.

Loose methods in allowing free repairs will undermine the correct principles of service about as quickly as any other one thing. Claims for free repairs should be settled absolutely on the merits of each claim, and in accordance with the warranty. Awards of free repairs can easily be run into enormous figures when the production is large, and the money spent for service is not helping the tractor owner to the greatest extent. Tractor companies should insist that all claims on defective parts be accompanied by the return to the factory of all such parts claimed to be defective. Such a system would soon form the basis for fairness in the settlement of such claims.

(To be continued)

Plan Better Tractor Meeting for 1918

(Continued from page 268)

Taking the trend of development, inclosure of all gearing is the most marked, it was bound to come and the stage has been reached now when any maker of a tractor with an exposed final drive is behind the times and knows it. Next in order comes the triumph of the truck type four-cylinder engine, this being now the conventional sort, the best examples a little heavier than truck practice demands and perhaps a trifle slower speed.

Hand in hand with the engine changes improvement in kerosene carburetion is noted. Probably none of the kerosene-burning tractors handle the fuel nearly as well as they can handle gasoline. Possibly we shall never discover how to carburete kerosene as efficiently, but the next stage in kerosene development will come from the engine builders and not the carbureter men, who have done as much as they can unaided. The tractors in the demonstrations burned kerosene with fewer stops and less smoke than last year, partly because carbureters are better, largely because

there has been a good deal of manifold redesigning, putting hot spots where they are needed and so on. The kerosene problem is still far from solved, but it is not quite so far from solution as it was last year.

It seems that four wheels with two-wheel drive is becoming standard practice. The machines which have one drive wheel and two small wheels are not so popular, and the drum drive, which consists of one very wide wheel with one or two in front for steering, does not appear to be gaining, although it has some distinct points in its favor. There is a general impression that two-wheel drive is most suitable for general purposes, the other types, including the track-laying, having special spheres of usefulness. There are more track-layers than before despite this impression.

As to size there is no question but that the three and four plow machines have the greatest utility. Larger and smaller sizes are needed, but on medium sized farms there is no question as to the most satisfactory size.

Detail is altogether better, except on the old-style machines, where it is as poor as ever. Better lubrication all over is the rule, more anti-friction bearings, more oil bath inclosures. Better protection against dust is also noted. Not only are valves more securely housed, but the use of dust collectors on the intake side of the carbureter is almost universal. Dust arresters on the crankcase breathers are also being used, and will certainly become conventional in a short time. Bigger radiators, stronger fans and wider fan belts are the rule, though the belts are still seldom really wide enough to give long service without trouble.

There are no radical changes, merely a development along the lines always anticipated by THE AUTOMOBILE and a development that is rather disappointing in its extent. More ought to have been done and it is to be hoped that more will be done in the next 12 months than has been in the year past. No doubt the interest of the Government will prove a stimulant.

4,242,139 Cars and Trucks

in the

United States

One Motor Vehicle to Every
24 Persons in Registrations
to July 1—Gain of 700,401,
or 20 Per Cent, Over 1916

By Donald McLeod Lay

Cars and Trucks in United States July 1, 1917

ALL DUPLICATE REGISTRA-
TIONS DEDUCTED

New York	345,936
Ohio	297,239
Illinois	285,000
Pennsylvania	254,735
California	247,168
Iowa	243,184
Texas	200,000
Michigan	189,000
Minnesota	168,000
Indiana	166,766
Wisconsin	142,080
Kansas	139,956
Massachusetts	133,119
Nebraska	128,142
Missouri	125,012
New Jersey	95,315
Oklahoma	72,500
Washington	68,282
Connecticut	63,345
Georgia	58,010
South Dakota	55,000
North Dakota	54,466
Colorado	54,280
Maryland	47,854
Virginia	44,550
Tennessee	42,000
Oregon	41,599
North Carolina	39,706
Kentucky	38,700
Maine	32,569
Montana	31,700
Alabama	29,103
South Carolina	28,725
Mississippi	26,046
Rhode Island	26,000
Louisiana	25,406
West Virginia	25,083
Arkansas	24,200
Idaho	17,900
New Hampshire	17,702
Utah	17,065
Arizona	16,750
Vermont	16,114
Florida	15,990
Dist. of Col.	14,525
New Mexico	10,995
Wyoming	9,650
Delaware	9,057
Nevada	6,615
Total	4,242,139

DESPITE the entry of the United States into the great world war, automobile and motor truck registrations and production show a marked gain for the first 6 months of 1917 over the corresponding figures of 1916. According to reports by the State Registration officials, there were 4,242,139 automobiles and trucks in use in the forty-eight states and the District of Columbia on July 1. This is a gain of 700,401 vehicles over the total registration up to Jan. 1, 1917, a percentage increase of 20. On the basis of a total population of 103,640,473, the estimate of the United States Census Bureau for July 1, 1917, there is one car or truck in service to every twenty-four of the population, as compared with one to twenty-nine at the beginning of this year, and one to forty-two at the end of 1915.

As compared with the registration statistics for the first 6 months of 1916, the increase of 700,401 cars and trucks made this year shows a gain of 191,724, the total registration for the first half of 1916 being 508,677.

Production To Decrease

It is striking that production for the first half of 1917 does not suffer by comparison with the same period last year in spite of the changes wrought by the war situation and the consequent reduction in their production schedules by many manufacturers. Reports from the factories indicate that approximately 800,000 automobiles and trucks were built in 1917 up to July 1. This compares with the production of 754,902 passenger cars and approximately 50,000 trucks during the first half of 1916. Of course it is certain that the remainder of 1917 will not see a continuation of this large-scale output, as many factories are already operating on a reduced schedule.

In considering these registration statistics it must be kept in mind that they include not only passenger cars, but also

4,242,139
1917 to July 1

3,541,738
1916

2,471,595
1915

1,736,790
1914

1,253,875
1913

1,010,483
1912

677,000
1911

REGISTRATION IN MILLIONS

motor trucks, taxicabs, buses, etc. The great bulk of the registration is composed of passenger automobiles, but there is a large representation of these commercial vehicles, totaling approximately 500,000 for the entire country.

One of the most interesting features of the new registration statistics is the fact that there are seven states with registrations of 200,000 or over as compared with only four states having attained this rank at the beginning of the year. At the beginning of 1916 New York was the only State having over 200,000 cars and trucks on its registration lists.

In the 100,000 class there are now only eight states, two of those included in this classification on Jan. 1, 1917, having graduated into the 200,000 division.

New York has greatly strengthened its hold on first place during the past 6 months, having added 66,530 cars and trucks, as compared with an increase of 45,060 in Ohio, which is still in second place. Illinois is still third with Pennsylvania fourth and California retaining fifth position, but Iowa has displaced Texas for sixth rank, at the same time attaining the distinction of the largest registration increase by adding 70,393 motor vehicles in the 6 months' period. Michigan still clings to eighth position, but Minnesota has jumped ahead of Indiana, and Wisconsin and Kansas have forced Massachusetts back to fourteenth place, Nebraska displacing Missouri for fifteenth. At the end of the list, Nevada still has a safe

Statistics by Years

Year	Registration	Production	Value, Output
1911	677,000	210,000	\$262,500,000
1912	1,010,483	378,000	378,000,000
1913	1,253,875	483,000	425,000,000
1914	1,736,790	573,114	465,042,474
1915	2,471,595	892,618	691,778,950
1916	3,541,738	1,617,708	1,274,625,864
1917, to July 1	4,242,139	*800,000	*650,000,000

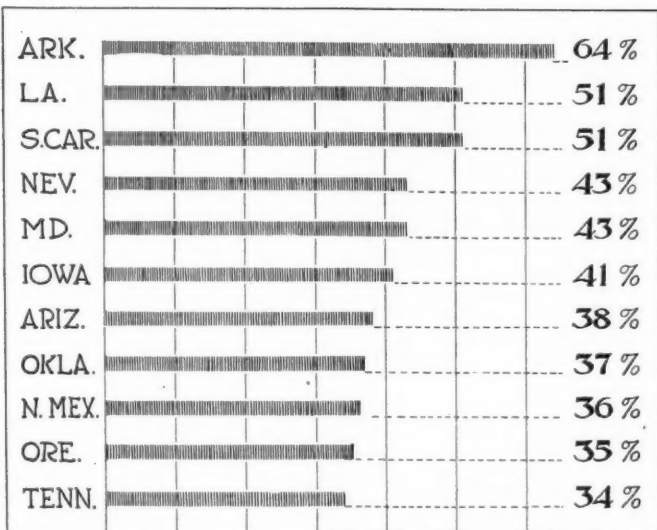
*Estimated.

margin on last position in spite of an increase of 2006 registrations since the beginning of the year. Wyoming, which was next to last in order of registrations on Jan. 1, has relegated this position to Delaware, which added only 1537 cars and trucks to its list up to July 1.

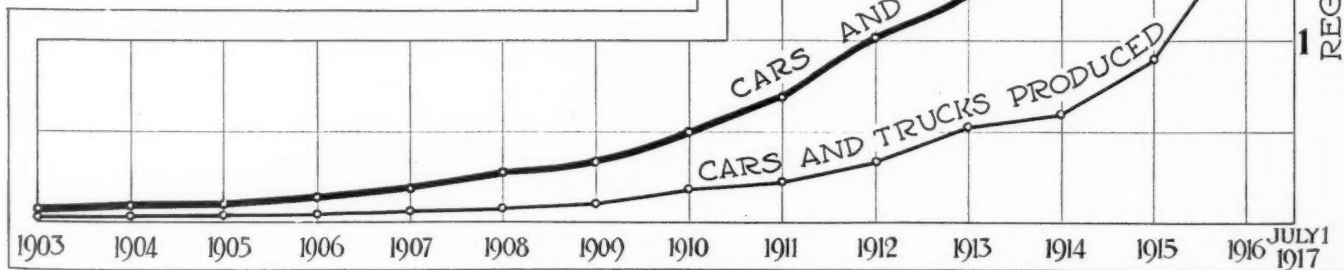
It was pointed out in the review of 1916 statistics published in THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES for March 15 that the largest increase in registration in both 1916 and 1915 was found to occur during the last 6 months of the year. Of the 1,070,143 registration increase last year, over 600,000 were added during the

period from July 1, 1916, to Jan. 1, 1917. It will be surprising, however, if this is found to be the case for the present year, as it is expected that there will be more or less of a decline in the rate of increase in registration for this period.

There are still eight States with over 50,000, but fewer than 100,000 cars and trucks registered. The same number are now found in the 30,000 to 40,000 class instead of the ten of that rank at the beginning of the year. Seven have between 20,000 and 30,000, according to the latest statistics, whereas at the end of 1916 there were but six of this rank. Eight rank between 10,000 and 20,000, just as before, but there are now only three States with under 10,000 motor vehicles instead of the four included in this classification at the close of 1916. From all indications, it will not be long before all of these three will have



Eleven States increased their registration over 33 per cent in the first 6 months of 1917



Registration and production curves, showing development since 1902. The slope of both curves will be farther from the vertical this year than has been the case for the past few years

graduated into the 10,000 class, two of them, Wyoming, with 9650, and Delaware, with 9057, probably having passed the 10,000 mark by the time this article goes to press. This leaves only Nevada, with 6615, below the 10,000 figure, and it will not be very long before this State will join the others at the present rate of increase in its registration, as it amounted to 2006, or, 43 per cent, for the first 6 months of this year.

Iowa has made a phenomenal leap in registration in-

crease, having jumped into first position from fourteenth place in this respect at the end of 1916. New York has made a great stride forward also, having attained second place, whereas it was only fourth in rank of gain last year. Ohio has dropped from second to third in this division, but California has gone ahead sufficiently to reach fourth place from sixth at the close of 1916. Illinois is fifth instead of third, and Minnesota, which was eighth last year, is now sixth; Michigan is seventh, having

moved forward from ninth; Nebraska, which was eleventh, is now eighth, and Indiana retains tenth place. Massachusetts shows an apparent decrease, due to the fact that there are nearly 10,000 re-registrations which were not available for 1916. The average per cent increase in registration throughout the Union is 20, which compares favorably with the 44 per cent gain for the entire year of 1916. Last year the increase during the last 6 months was greater than in the first half of the year, so that the 20 per cent figure developed this year indicates that the rate of increase is practically the same as that in the corresponding period of 1916. It must not be forgotten, however, in considering these statistics that the respective numbers are much larger for 1917 than for the first half of 1916, as has already been pointed out.

Iowa Leads in Gains

In addition to holding first place in the list of registration increases, Iowa has the honor of being the only State with fewer than ten persons per motor vehicle, its automobile and truck registration up to July 1, in relation to the Census Bureau estimate of 2,224,771 population for the State, indicating only nine people to each car or truck. In other words, allowing for the greater carrying capacity of the commercial vehicles, buses, etc., included in its registration, Iowa has enough motor vehicles to transport its entire popula-

Increase in Registration

State	Increase in Cars	Per Cent Increase
Iowa	70,393	41
New York	66,530	24
Ohio	45,060	18
California	34,250	16
Illinois	33,700	13
Minnesota	30,500	22
Michigan	29,361	18
Nebraska	26,941	26
Indiana	27,628	20
Kansas	25,592	22
Wisconsin	24,477	21
Pennsylvania	24,087	10
New Jersey	20,207	27
Oklahoma	19,782	37
Missouri	17,147	16
Maryland	14,490	43
North Dakota	12,705	30
Georgia	12,235	27
South Dakota	10,729	24
Oregon	10,682	35
Tennessee	10,600	34
Colorado	10,100	23
South Carolina	9,725	51
Arkansas	9,496	64
Virginia	9,124	25
Louisiana	8,606	51
Connecticut	7,297	13
Kentucky	7,200	23
Montana	7,115	29
Alabama	6,749	30
Washington	5,736	9
Mississippi	5,572	28
Idaho	4,904	13
West Virginia	4,646	23
Arizona	4,628	38
Rhode Island	4,594	21
North Carolina	4,556	13
Maine	3,618	12
Utah	3,558	26
New Hampshire	3,364	24
New Mexico	2,867	36
Wyoming	2,525	35
Texas	2,313	12
Nevada	2,006	43
Vermont	1,863	13
Florida	1,770	12
Delaware	1,537	20
Dist. of Columbia	1,407	11
*Massachusetts	.....	..
Total	703,972	..
Average increase	.....	20

*Apparent decrease, due to re-registrations, which were not available for 1916.

Registration and Population

State	Pop. July 1, 1917	Cars and Trucks	Pop. Per Car
Iowa	2,224,771	243,184	9
Nebraska	1,284,126	128,142	10
California	3,029,032	247,168	12
Kansas	1,851,870	139,956	13
South Dakota	716,972	55,000	13
Minnesota	2,312,445	168,000	14
North Dakota	765,319	54,466	14
Montana	472,935	31,700	15
Arizona	263,788	16,750	16
Michigan	3,094,266	189,000	16
Indiana	2,835,492	166,766	17
Wisconsin	2,527,167	142,000	17
Nevada	110,738	6,615	17
Colorado	988,320	54,280	18
Ohio	5,212,085	297,239	18
Wyoming	184,970	9,650	19
Connecticut	1,265,373	63,345	20
Oregon	861,992	41,599	21
Illinois	6,234,995	285,000	22
Maine	777,340	32,569	22
Texas	4,515,423	200,000	22
Vermont	364,946	16,114	23
Washington	1,597,400	68,282	23
Delaware	215,160	9,057	24
Rhode Island	625,865	26,000	24
Dist. of Columbia	369,282	14,525	25
Idaho	445,176	17,900	25
New Hampshire	444,429	17,702	25
Utah	443,866	17,065	26
Missouri	3,429,595	125,012	27
Massachusetts	3,775,973	133,119	28
Maryland	1,373,673	47,854	29
New Jersey	3,014,194	95,315	30
New York	10,460,182	345,936	30
Oklahoma	2,289,855	72,500	32
Pennsylvania	8,660,042	254,735	34
New Mexico	893,649	10,995	39
Georgia	2,805,841	58,010	50
Virginia	2,213,095	44,550	50
Tennessee	2,304,699	49,000	55
West Virginia	1,412,609	25,083	56
Florida	916,185	15,000	57
South Carolina	1,643,205	28,795	57
North Carolina	2,434,381	39,706	61
Kentucky	2,294,003	38,700	69
Louisiana	1,856,954	25,406	73
Arkansas	1,766,343	24,200	73
Mississippi	1,976,570	26,646	76
Alabama	2,363,939	29,103	81
Total	103,640,473	4,242,139	..
Average for U. S.	.....	.....	24

Dealers, Garages, Machine Shops and Supply Houses in Operation

State	Dealers	Garages	Re-pair Shops	Cos. Having Supply Depts.	Job-bers	Supplies Exclusively	Total	State	Dealers	Garages	Re-pair Shops	Cos. Having Supply Depts.	Job-bers	Supplies Exclusively	Total
Alabama	171	110	89	41	2	26	291	New Jersey	627	865	429	208	1	79	1290
Arizona	100	90	58	37	..	14	171	New Mexico	99	80	43	38	..	8	152
Arkansas	183	111	68	44	..	22	278	New York	1929	2227	1220	476	15	314	3804
California	1191	1317	850	356	19	150	2198	North Carolina	328	242	114	95	1	25	459
Colorado	341	321	194	111	3	21	528	North Dakota	511	330	199	139	1	10	2682
Connecticut	446	480	263	111	7	74	845	Ohio	1746	1402	670	494	27	143	2648
Delaware	70	64	27	11	..	5	97	Oklahoma	388	329	155	156	3	28	616
Dist. of Columbia	65	58	36	9	3	20	146	Oregon	209	242	137	74	4	26	381
Florida	254	260	176	86	2	40	482	Pennsylvania	1730	1761	856	566	14	207	3005
Georgia	357	258	131	74	1	44	97	Rhode Island	90	142	92	16	5	12	264
Idaho	162	110	64	48	1	17	208	South Carolina	181	117	63	54	2	18	279
Illinois	1853	1677	964	446	19	126	2930	South Dakota	435	315	176	111	2	7	594
Indiana	975	822	436	288	10	60	1539	Tennessee	220	152	92	67	3	26	326
Iowa	1579	1345	711	486	7	61	2313	Texas	719	558	297	200	10	85	1231
Kansas	853	786	426	344	8	29	1478	Utah	97	70	47	25	3	12	156
Kentucky	291	236	93	78	3	25	417	Vermont	176	162	95	55	..	11	281
Louisiana	148	80	51	40	3	18	216	Virginia	257	192	128	58	1	42	415
Maine	294	262	140	97	3	16	481	Washington	365	355	194	92	7	46	638
Maryland	239	249	128	78	2	32	420	West Virginia	209	145	63	61	..	13	265
Massachusetts	780	863	436	205	15	128	1495	Wisconsin	1043	901	428	309	81	41	1460
Michigan	943	837	367	269	7	89	1511	Wyoming	82	62	40	26	..	9	120
Minnesota	1122	823	472	280	14	42	1528	Territory of Hawaii	11	8	9	3	..	6	19
Mississippi	137	88	47	39	..	13	194	West Indies	26	22	5	7	..	3	38
Missouri	787	629	413	218	16	67	1315	Canada	924	817	415	203	19	71	1354
Montana	250	202	135	91	2	11	348	Mexico	9	..	4	2	..	2	17
Nebraska	807	648	283	222	8	23	1099								
Nevada	56	52	29	16	..	5	88								
New Hampshire	187	209	103	63	..	11	324								
								Total	27,052	24,483	13,161	7,723	282	2,433	45,531



Distribution of automobiles and motor trucks in the United States, all duplicate registrations being deducted

Automobile and Truck Registrations in United States to July 1, 1917

State or Territory	Total Registration	New Registration	Registration Up to Jan. 1, 1917	Gasoline Passenger Cars in Use	Gasoline Commercial Cars in Use	Electric Passenger Cars in Use	Electric Commercial Cars in Use	Non-Resident Registration*	Re-Registered**	Chauffeurs Registered	Total Fees	Remarks
Alabama	29,103	6,749	22,354	24,121	4,982	...	...	150	500	3,115	\$103,701	
Arizona	17,400	5,278	12,122	...	...	...	...	...	...	273	242,273	
Arkansas	24,200	9,496	14,704	...	...	...	...	2,000	...	12,248	2,506,698	
California	249,168	36,250	212,918	...	...	...	...	...	...	...	...
Colorado	54,280	10,100	44,180	...	...	...	...	...	...	...	936,605	
Connecticut	63,345	7,297	56,048	53,388	9,957	...	...	...	...	...	107,547	
Delaware	9,557	2,037	7,520	...	...	...	...	...	500	...	54,008	New law
Dist. of Col.	14,525	1,407	13,118	13,268	1,053	204	...	...	...	...	202,862	
Florida†	15,990	1,770	14,220	...	...	...	...	20	...	3,125	216,000	
Georgia	58,030	12,255	45,775	53,625	3,000	400	5	...	...	848	1,010,903	
Idaho	18,000	5,004	12,996	17,900	...	100	...	...	100	...	645,810	
Illinois	285,000	33,700	251,300	...	...	...	...	...	...	...	264,127	
Indiana	168,766	29,628	139,138	...	...	...	...	...	2,000	4,300	...	
Iowa	243,184	70,393	172,791	...	...	...	...	...	...	...	...
Kansas	139,956	25,592	114,364	...	...	...	...	...	...	...	...
Kentucky	88,700	7,200	81,500	...	...	...	...	...	...	...	...
Louisiana	25,406	8,606	16,800	...	...	...	...	...	...	...	395,864	
Maine	32,569	3,618	28,951	30,874	2,695	...	...	1,000	1,600	...	453,335	
Maryland	50,454	17,090	33,364	47,120	2,279	540	515	...	9,730	6,000	1,607,796	
Massachusetts	142,851	6,061	136,790	120,877	21,974	...	...	2	6,000	14,400	2,225,401	
Michigan	200,000	40,361	159,639	...	...	...	...	5,000	6,000	...	200,000	Triennial registration.
Minnesota	168,000	30,500	137,500	...	...	...	...	None	...	...	517,573	
Mississippi	26,046	5,572	20,474	...	...	...	...	89	1,982	11,897	231,190	
Missouri	127,083	19,218	107,865	120,728	6,355	...	...	...	300	595	...	
Montana	32,000	7,415	24,585	31,388	600	12	...	...	...	...	...
Nebraska	128,142	26,941	101,201	...	...	...	...	...	...	...	...
Nevada	6,650	2,041	4,609	6,550	95	5	None	35	...	None	25,400	
New Hampshire	18,870	4,532	14,338	...	...	...	...	225	943	6,875	304,574	
New Jersey	119,361	44,253	75,108	113,393	5,968	...	...	12,000	12,046	...	1,572,608	
New Mexico	10,995	2,967	8,028	...	...	...	...	...	...	...	...
New York	345,936	66,530	279,406	291,080	54,856	...	...	...	...	107,735	3,097,528	
North Carolina	39,806	4,656	35,150	...	...	...	...	100	...	None	211,644	
North Dakota	54,466	12,705	41,761	...	...	...	...	...	...	...	...
Ohio	302,013	49,834	252,179	...	...	4,400	...	174	4,600	...	1,560,000	
Oklahoma	72,500	19,782	52,718	...	...	None	None	None	None	...	700,000	
Oregon	41,599	10,682	30,917	...	...	...	...	...	...	2,647	166,324	
Pennsylvania	266,573	35,925	230,648	251,788	14,785	...	...	...	11,838	53,847	2,745,324	
Rhode Island	26,000	4,594	21,406	22,000	4,000	...	...	...	...	...	...
South Carolina	29,000	10,000	19,000	28,975	...	25	...	200	75	None	86,169	
South Dakota	55,000	10,729	44,271	...	...	...	...	...	1,000	None	273,000	
Tennessee	43,000	11,600	31,400	42,900	...	100	...	...	...	None	...	
Texas	200,000	2,313	197,687	...	...	...	...	...	...	...	...
Utah	17,190	3,683	13,507	15,540	1,500	150	...	...	125	1,184	150,500	Perennial
Vermont	16,612	2,361	14,251	15,621	980	7	4	...	498	1,859	295,926	
Virginia	45,050	9,624	35,426	...	...	...	...	500	...	2,400	450,539	
Washington	68,282	5,736	62,546	...	...	...	...	None	None	...	402,182	
West Virginia	25,083	4,646	20,437	...	...	...	...	...	...	...	720,800	
Wisconsin	142,080	24,477	117,603	...	...	...	...	...	50	None	47,494	
Wyoming	9,700	2,575	7,125	...	...	...	...	...	...	...	...
Total	4,317,521	775,783	3,541,738	1,301,136	135,079	5,943	524	21,495	53,887	233,348	\$24,731,705	

NOTE.—Steam cars and trucks are included with the gasoline vehicle statistics, as segregation is not carried out by registration officials. *Number of cars registered owned by citizens of other States. **Number of vehicles re-registered, owing to transfer of ownership, etc. ...Statistics not available. †Estimated by State registration officials. ‡Estimated by Secretary of State that there are probably 50,000 cars and trucks in use in State. §Trucks not included in registration statistics till after July 1, 1917.

tion at once. Nebraska is a close second to Iowa, having an average of twelve persons for each car or truck on its records. California has only twelve, which is remarkable when its population of 3,029,032 is considered, and two States, Kansas and South Dakota, are entitled to boast a motor vehicle to every thirteen people within their borders. Two other States, Minnesota and North Dakota, have only fourteen people per car or truck, and Montana has but fifteen. Arizona and Michigan have sixteen, Indiana, Wisconsin and Nevada seventeen, and Colorado and Ohio eighteen, with Wyoming nineteen and Connecticut twenty. The other States range from Oregon, with twenty-one, up to Alabama, which has eighty-one people for each car or truck.

Cutting Down the Ratio

A comparison with the population-to-car ratio in the various States at the end of 1916 is of value. Up to July 1, 1917, there were sixteen States with fewer than twenty persons per car or truck, as compared with only ten in this class last year; sixteen more States averaged between twenty and thirty persons per vehicle, as against seventeen in the 1916 list; the remaining seventeen are made up of five States having an average of between thirty and forty, six with fifty to sixty, two in the sixties, three seventies and one with over eighty. Last year nineteen States averaged over thirty persons to each motor vehicle registered, with seven in the thirty-to-forty division and twelve averaging from forty-one to 100 people per motor vehicle. The remaining three, Alabama, Louisiana and Arkansas, all had over 100. This year Louisiana and Arkansas have seventy-three, instead of 108 and 118 respectively, and Alabama has eighty-one instead of 104.

The Saturation Point

The saturation point of the automobile market has been the subject of many earnest debates during the last few years, but despite profuse predictions from all varieties of people in all sections of the country this imaginary state of the sales situation has never materialized. From year to year registration statistics have continued to show tremendous gains and the population-to-car ratio has steadily declined, yet there has always been an active market in every State. To-day, war conditions have produced a slowing-up, which may prove temporary, or not, depending on developments in our success in the war and our general prosperity. At the same time, there is every reason to believe that there is still a wide potential market for our manufacturers in every State in the Union. Motor vehicles are far from indestructible; they wear out in a few years, as a rule, under severe usage, difficult road conditions, carelessness of owners and drivers, etc. This means that there must be a steady stream of new cars and trucks coming from our factories to fill the places of machines which have been scrapped, in addition to the large number required for our export trade, which is growing to be a business of very large dimensions, especially in the Far East and South America. Moreover, there are bound to be thousands of new car owners coming into the market every year in our own country, so we can readily see that, while some reduction of production will be necessary in the immediate future, our manufacturers

DISTRIBUTION OF CAR, TRUCK AND ENGINE MANUFACTURERS IN THE UNITED STATES AND CANADA

State	Automobiles	Commercial Vehicles	Engines	Total
California	5	14	..	17
Colorado	1	..	..	1
Connecticut	4	3	2	8
Delaware	..	1	..	1
District of Columbia	..	1	..	1
Georgia	..	3	..	3
Illinois	21	36	4	67
Indiana	26	15	5	42
Iowa	..	9	..	9
Kansas	1	2	..	3
Kentucky	2	3	..	4
Louisiana	1	1	..	2
Maine	..	1	..	1
Maryland	2	2	..	2
Massachusetts	6	13	..	15
Michigan	47	48	15	101
Minnesota	6	35	..	38
Missouri	6	12	..	16
Nebraska	1	2	..	3
New Hampshire	..	1	..	1
New Jersey	3	7	1	11
New York	21	41	8	65
North Carolina	..	1	..	1
Ohio	37	45	5	79
Oregon	1	..	..	1
Pennsylvania	13	27	5	40
Rhode Island	..	1	..	1
South Carolina	1	..	..	1
Texas	1	1	..	2
Virginia	2	1	..	3
Washington	2	6	..	6
West Virginia	2	2	7	2
Wisconsin	6	22	..	33
Canada	20	16	1	30
Total	238	372	53	610

need not agitate themselves over a possible disappearance of their market.

That the export business in automobile and motor trucks is rapidly becoming an important factor in the American industry is realized from the fact that there were 43,269 cars and trucks, worth \$44,319,541, exported in the 6 months period from Jan. 1, 1917, to July 1. These were made up of 36,057 automobiles and 7212 trucks, the respective total valuations being \$27,116,035 and \$17,203,506.

As in 1916, the war order business so far in 1917 did not represent anything like the volume or value that it did in the 2 previous years. Practically no passenger cars are being sent to Europe for war purposes, the great bulk of the motor vehicle shipments being made up of trucks and tractors.

Cars Exports Gain

An analysis of the tabulation appearing herewith shows that the shipments of passenger cars abroad have been increasing, on the whole, though February, when they declined to 3935, as compared with 4733 in the preceding month, and May, which recorded 6725, prevent the gains from being regular and in constant proportion. The figure for June, however, 7609, when contrasted with the 4733 representing January shipments, shows that our foreign trade in automobiles is rapidly gaining.

Motor trucks do not show the increasing volume in our export statistics that characterizes the passenger cars, but tend to maintain a more or less constant level which averages somewhat over 1200 per month. As in the case of the automobile shipments, commercial vehicle exports dropped off materially in February, but, strange to note, they reached their highest peak during the 6-month period in May, when they totalled 1764.

In regard to the value of the cars and trucks shipped abroad, it is significant that a given number of trucks are worth, in the aggregate, approximately as much as four times the number of automobiles.

The number of manufacturers of automobiles, motor trucks and engines in the United States and Canada has increased from 575 to 610 in the first 6 months of this year. The automobile makers have increased by seven, the total now being 238 as compared with 231 at the end

MOTOR VEHICLE EXPORTS IN FIRST 6 MONTHS OF 1917

Month	Cars	Value	Trucks	Value
January	4,733	\$3,860,224	1,340	\$3,515,210
February	3,939	2,852,308	784	2,128,665
March	5,775	4,025,389	1,040	2,961,389
April	7,276	5,166,640	1,039	2,416,368
May	6,725	5,489,980	1,764	3,216,620
June	7,609	5,721,494	1,245	2,965,254
Total	36,057	\$27,116,035	7,212	\$17,203,506

of 1916. There are now 372 manufacturers of commercial vehicles, whereas there were only 364 in this classification on Jan. 1. Two engine makers have been added to the list, the present total being fifty-three. These manufacturers are located in thirty-two States, the District of Columbia and Canada. A large proportion of the thirty factories in Canada are branches or outgrowths of plants in the United States.

A comparison of the dealers, garages, machine shops and supply houses shows an increase of 4619, the total for the United States, including Hawaii, the West Indies, Canada and Mexico, being 45,531 as compared with 40,912 at the end of last year. There are now 27,052 dealers as against 25,924 at the beginning of 1917; garages number 24,483 as against 23,686; repair shops 13,161 as compared with 12,171; companies having supply departments 7723 as against 5675; jobbers, who were listed with the dealers in supplies last year, 282, and dealers in supplies exclu-

sively now number 2433, in addition to the jobbers, as compared with 2503 at the close of 1916. The detailed statistics appearing in the accompanying tabulations covering distribution of manufacturers and that of dealers, garages, etc., were compiled by *The Automobile Trade Directory*.

Unlike previous years, it is now possible to secure registration statistics which are, even in the cases of States which have only recently instituted departments to record their motor vehicles, very close to the actual number of cars and trucks in operation. It is manifestly impossible to secure information on this subject which is absolutely accurate, as the statistics are so ephemeral that they change while the various figures are being compiled. An example is the case of Texas, for which the various counties report a total of 239,312 registrations, whereas the secretary of state bases his estimate of 200,000 on the appraisal that there are nearly 40,000 duplicates.

Texas Registration, By Counties, Shows 22% Gain

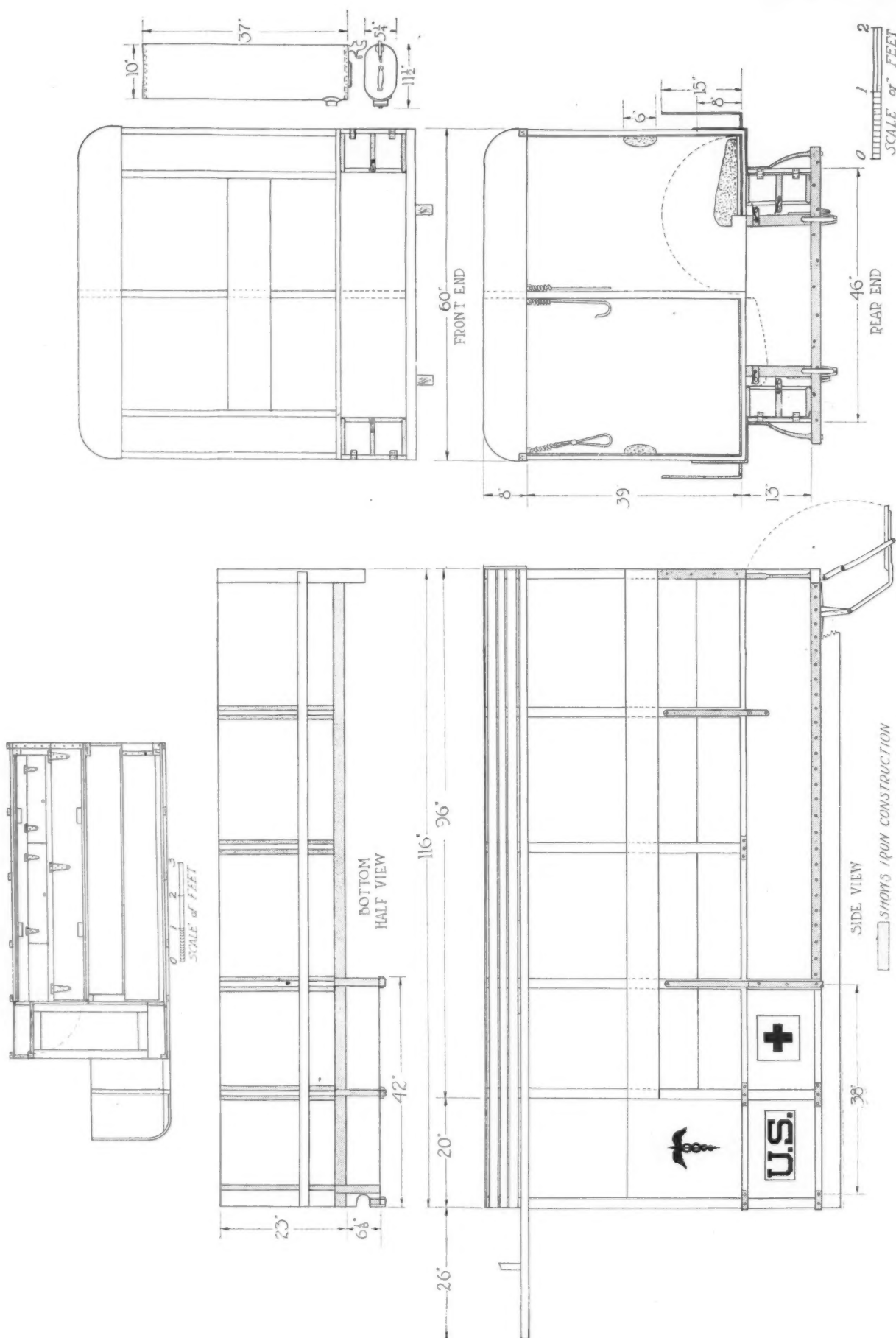
AUSTIN, TEX., Aug. 11—It will be some little time before the State Highway Commission is finished with its work of distributing licenses to automobiles and other motor vehicles in Texas and until that has been done it will not be officially known how many of these vehicles there are in this State. In response to a request made of the clerks of the different counties for statements of the number of automobile registrations in their respective counties, a complete list

of these up to July has been received. The compilation of the registrations of the counties shows a gain of 22 per cent between Jan. 1 and July 1. The heaviest gains were in the rural counties. In the larger cities the sales show a considerable falling off as compared with the preceding 6 months. The total of 239,312 probably includes nearly 40,000 duplicate registrations, according to the estimate of the secretary of state. A comparison of registration statistics follows:

Licenses		Licenses		Licenses		Licenses		Licenses			
Counties	July 1, 1917	Jan. 1, 1917	Counties	July 1, 1917	Jan. 1, 1917	Counties	July 1, 1917	Jan. 1, 1917	Counties	July 1, 1917	Jan. 1, 1917
Anderson	639	840	Duval	93	115	Kaufman	1,314	1,633	Reeves	363	437
Andrews	38	50	Eastland	520	1,098	Kendall	424	500	Refugio	166	193
Angelina	*	391	Ector	69	75	Kent	170	209	Roberts	209	239
Archer	248	320	Edwards	165	210	Kerr	374	447	Robertson	384	434
Armstrong	328	400	Ellis	3,246	3,854	King	40	45	Rockwall	460	537
Atascosa	300	385	El Paso	8,161	10,393	Kimble	215	283	Runnels	1,162	1,382
Austin	522	656	Erath	795	967	Kinney	108	137	Rusk	286	395
Bandera	121	168	Falls	1,161	1,432	Kleberg	222	268	San Augustine	*	190
Bastrop	627	740	Fannin	1,219	1,571	Knox	568	688	San Jacinto	50	105
Baylor	444	537	Fayette	977	1,167	Lamar	1,604	2,056	San Patricio	450	499
Bee	448	506	Fisher	700	812	Lamb	95	121	San Saba	172	202
Bell	2,325	2,823	Floyd	660	850	Lampasas	529	635	Scurry	516	673
Bexar	11,564	13,506	Foard	*	445	Lavaca	821	1,026	Schackelford	330	397
Blanco	241	281	Fort Bend	514	608	Lee	225	325	Shelby	361	449
Borden	78	106	Franklin	100	150	Leon	205	283	Sherman	235	286
Bosque	954	1,075	Freestone	371	469	Liberty	288	380	Smith	851	1,201
Bowie	849	1,147	Frio	349	388	Limestone	1,120	1,388	Somervell	85	112
Brazoria	525	697	Gaines	119	137	Lipscomb	430	560	Starr	117	146
Brazos	461	588	Galveston	3,365	3,798	Live Oak	104	137	Stephens	245	326
Brewster	*	391	Garza	246	316	Llano	350	412	Sterling	142	163
Briscoe	248	302	Gillespie	678	858	Lubbock	740	934	Stonewall	258	316
Brooks	111	130	Glasscock	94	120	Lynn	*	335	Sutton	225	266
Brown	1,068	1,353	Goliad	362	436	McCulloch	653	750	Swisher	490	558
Burleson	396	550	Gonzales	929	1,118	McMullen	38	54	Tarrant	10,035	11,347
Burnet	540	637	Gray	429	516	McLennan	4,913	5,885	Taylor	1,655	1,974
Caldwell	973	1,134	Grayson	2,700	3,234	Madison	156	207	Terrell	71	92
Calhoun	167	186	Gregg	310	376	Marion	83	113	Terry	147	196
Callahan	517	710	Grimes	354	432	Martin	115	127	Throckmorton	252	294
Cameron	1,073	1,288	Guadalupe	1,200	1,387	Mason	356	426	Titus	214	306
Camp	172	228	Hale	1,146	1,384	Matagorda	659	784	Tom Green	1,638	1,983
Carson	356	438	Hall	796	937	Maverick	383	461	Travis	3,643	4,300
Cass	297	381	Hamilton	862	1,016	Medina	681	780	Trinity	187	252
Castro	185	217	Hansford	177	225	Menard	226	270	Tyler	68	117
Chambers	212	269	Hardeman	774	942	Midland	463	521	Upshur	298	379
Cherokee	530	747	Hardin	606	751	Milam	995	1,234	Upton	28	32
Childress	668	821	Harris	12,073	14,162	Mills	390	480	Uvalde	647	741
Clay	767	924	Harrison	803	1,004	Mitchell	530	631	Valverde	543	656
Coke	222	253	Hartlev	89	106	Montague	638	775	Van Zandt	557	756
Coleman	817	1,063	Haskell	700	889	Montgomery	199	259	Victoria	615	729
Collin	2,083	2,525	Hays	670	788	Moore	87	100	Walker	167	215
Collingsworth	433	559	Hemphill	304	399	Morris	118	182	Waller	252	310
Colorado	594	743	Henderson	244	372	Motley	185	231	Ward	112	144
Comal	641	757	Hidalgo	819	1,080	Nacogdoches	432	532	Washington	686	804
Comanche	604	834	Hill	2,283	2,747	Navarro	2,273	2,807	Webb	881	950
Concho	315	383	Hood	247	312	Newton	182	225	Wheeler	322	409
Cooke	789	994	Hopkins	636	898	Nolan	688	811	Wharton	769	941
Coryell	871	1,064	Houston	333	465	Nueces	1,343	1,468	Wichita	2,788	3,564
Cottle	247	317	Howard	640	757	Ochiltree	326	439	Wilbarger	1,030	1,222
Crockett	185	215	Hunt	1,646	2,102	Oldham	86	103	Winkler	12	15
Crosby	*	430	Hutchinson	87	94	Orange	521	630	Williamson	2,846	3,366
Culberson	77	94	Irion	138	160	Palo Pinto	823	1,041	Wise	551	745
Dallam	353	429	Jack	285	366	Parker	864	1,050	Wood	352	500
Dallas	16,550	18,947	Jackson	281	334	Parmer	198	264	Yoakum	60	83
Dawson	238	306	Jasner	252	303	Pecos	305	360	Young	479	632
Deaf Smith	488	586	Jeff Davis	110	133	Polk	183	248	Zapata	40	40
Delta	536	664	Jefferson	3,772	4,422	Potter	1,551	1,804	Zavalia	155	190
Denton	1,329	1,605	Jim Hoge	48	62	Presidio	230	297			
DeWitt	1,230	1,474	Jim Wells	202	233	Rains	95	144			
Dickens	227	306	Johnson	1,429	1,792	Randall	371	468			
Dimmit	232	313	Jones	1,277	1,547	Reagan	59	59			
Donley	465	557	Karnes	735	886	Red River	646	876			
									Totals	195,935	239,312
									*No January report.		

*No January report.

U. S. ARMY AMBULANCE TO FIT ANY STANDARD CHASSIS



Army Ambulance Body Specifications

One Set of Specifications for an Ambulance Body to Fit the Standard
Ford Chassis and the Other for an Ambulance
Body to Fit Any Chassis

TWO sets of specifications for ambulance bodies were issued last week by the Quartermaster-General's Department, one for a body fitting the regular Ford chassis and the other for a body to fit any chassis. As these specifications will interest all firms in the body-building line, we reprint them below in full:

Specifications for United States Army Ambulance to Fit Any Chassis

1. General Provisions: The materials called for must be of the best and highest grades mentioned in the specifications, and the work must be thoroughly and faithfully executed in all its parts.
2. Inspection: The material and workmanship will be inspected as work progresses, by a representative of the Medical Department.
3. Lumber: Special care must be observed that all wood is well seasoned.
4. Unless otherwise distinctly stated in the body of these specifications the kinds of lumber used for different purposes will be as follows:
 5. All wood stock in body proper will be ash, maple, beech or birch, of the first quality, for front boards, side boards, lazy backs, rails, and all wood work not otherwise specified. Flooring to be of pine of first quality. All lumber to be of standard woods, first grade specifications.
 6. Ash bows supporting top to be of XXX ash.
 7. All cross bars, front and rear sills to be of best quality hard wood specifications, ash or maple.
 8. All steel angles to be of proper size and best quality of steel. All other irons to be of open hearth soft American steel unless otherwise specified.
 9. Best American soft iron for clips, bolts and rivets. All fastenings of steel or wood as required, to be bolted, screwed or riveted. No nails to be used throughout.
 10. Paints and oils of best quality of their respective kinds and strictly pure.
 11. All interior posts to be of first quality Northern White Ash.
 12. All interior closets to be as specified in original specifications.
 13. Water tanks to be as originally specified, but made of No. 20 galvanized iron with reinforced seams. Top of tank at front ends to have cap for filling, and on the front, at the bottom, there is to be a $\frac{5}{8}$ -in. brass spigot. Spring over tank to keep tank from jostling. Small brass handle to be placed on front of tank, just above spigot. All tanks to be oval in design.

Body

1. Capacity: Four persons prone, or eight persons in a sitting posture. Length of body over driver's seat 9 ft. 8 in., length of body back of driver's seat, over all 8 ft. Width of body over all, 5 ft., height of body, 5 ft. 9 in., top extends front 2 ft. 2 in.
2. Bottom frame work: two 2 by 2 by $\frac{3}{16}$ in. angle iron sills, reinforced and riveted to side boards, extending lengthwise whole length of body. Width over all, 46 in. with cross sills also reinforced on both sides by angle irons resting on top of side sills and bolted and riveted thereto. Sides of sills to be suitably riveted and strengthened by angle irons to prevent all warping or checking. All cross sills to be suitably bolted to sills running lengthwise, through bottom boards and to panel irons above same. Bottom boards under gas tank to be screwed in separate from rest of floor, so they

can be removed—tank space 20 in. by 38 in. under seat. No wooden cover over gasoline tank. Cushion to cover same.

3. All studs and posts to be of ash, same sizes as in original specifications.

4. Top slats to be of soft wood 8 ft. long, $1\frac{1}{4}$ in. by $\frac{3}{8}$ in., nailed to bows, 1 in. apart around bend and 3 in. apart over the flat part of top.

5. Bows: Six long bent bows of ash $\frac{7}{8}$ in. by $1\frac{1}{4}$ in., first, second, and third bows to extend to bottom of extension sills, and clipped to sills with 1 in. by $\frac{1}{8}$ in. wrought iron clips; fourth, fifth and sixth bows to extend to the bottom of the deck sills, fastened in same manner. Mouldings over curtains all way round top securely fastened with screws.

6. Panels: Panelling at side of driver's seat, between first and second bows, 22 in. from bottom of $\frac{1}{2}$ -in. bass wood. At right-hand side of seat there is to be a locker with three shelves for carrying supplies, $1\frac{1}{2}$ -in. strips on two lower compartments, 4-in. strips on two upper. This locker to open over front seat and to be fastened with a hasp and staple. Between first and third bows, there are to be compartments on each side for water tanks. Doors in front of these compartments to swing and to be provided with hook and cock-eye. On these doors are two thin iron plates, $1\frac{1}{8}$ in. by $\frac{1}{8}$ in., fastened with rivets. There are also to be compartments directly under longitudinal seats with doors hinging from bottom of body and opening toward the center of body, fastened by hasp and lock to seat-sill. Trap door front section of seat, hasp and staple on top. There is to be a division one-half way between driver's seat and tailgate in each of these compartments. Lower side panel $\frac{3}{4}$ -in. hard wood, the side panels above deck to be of $\frac{1}{2}$ -in. bass wood. Lazy back at side to be of hard wood $\frac{3}{4}$ in. by 6 in. wide. These lazy backs are upholstered on the inside as specified in No. 15 of General Provisions. Lazy back is to be notched $\frac{1}{4}$ in. over bows to make them flush with panel. Rear posts are to be bound with angle iron to prevent splitting. Hinges are to be above rear sills, tailgate the same height as deck, making proper allowances for iron. Hooks are to be bolted to tailgate and made to engage with cockeyes to fasten when closed.

7. Step-board: Is to be made independent from tailgate and to fold up with same. To be built so as to close automatically when tailgate is thrown up. To be thoroughly braced with folding irons.

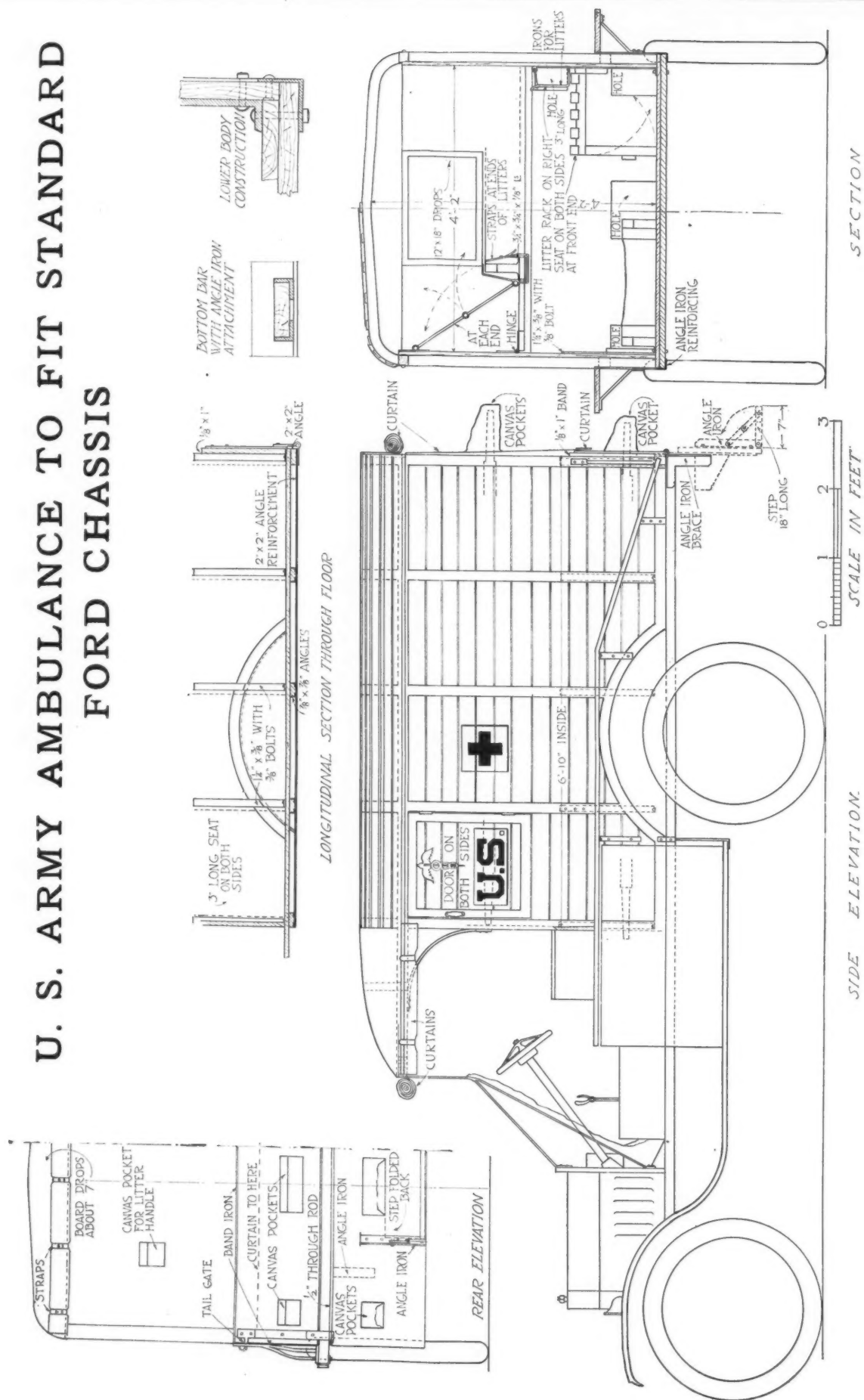
8. Litter irons are to be provided on each side of the body and are to be fastened to the third and fifth bows with 5/16 bolts. Irons are to be made of $1\frac{1}{8}$ in. by $\frac{3}{8}$ in. steel, 13 in. high, 3 in. wide on the inside, to have a strap attached to bows to retain litters in place.

9. Center posts supporting litter carriers are to be made of best quality northern ash and ironed solid to bottom and top.

Trimmings

1. Front cushion: To be 18 in. by 48 in., made regular style with springs, to be covered with heavy canvas. Top and sides of this cushion to be covered with Spanish leather of quality submitted with order. Regular roll on the front edge of cushion. Top of cushion is to be stuffed with hair not less than 3 in. in thickness. Lazy backs are to be covered with Spanish leather and padded 3 in. thick with hair. Inside seats are to be made 17 in. wide, furnished with box seat cushions, same general make as sample body. These springs are to be placed three springs on a drop-bar. Springs are $3\frac{1}{2}$ in. high, placed 4 in. from center to center, filling the entire top of seats. Depth of frame for springs is 2 in. Springs are to be covered with heavy canvas, securely attached to frame. On this is placed a hair filling of sufficient

U. S. ARMY AMBULANCE TO FIT STANDARD FORD CHASSIS



thickness to make a comfortable cushion. Top and sides of cushion are to be covered with Spanish leather, lazy backs are to be made same as front lazy back. Spring roller curtain, made of canvas, provided with snaps to fasten down. This canvas to be selvaged on both edges and a hem turned up at bottom so as to receive an iron strip.* This curtain to roll up and fasten with three straps, hooks and rings. Curtain hemmed all around with 2-in. hem. Curtain to extend 4 in. below deck and 4 in. around with a 2-in. hem. Brass grommet eyelets in bottom corners. These eyelets are provided with tie-ropes. All ropes spliced in grommet and around at end to prevent unwinding. Where a curtain is tacked on to headpiece, there is to be a drip molding screwed over curtain. Side curtains are to extend 4 in. front of second bow and to rear of body and 4 in. below deck panel. These curtains are tacked on top and side rail. Two-inch hem on ends and bottom.

Three grommet eyelets with rings furnished with tie-ropes at bottom of curtain. These curtains roll up and are held in position by five straps, hooks and rings. One small curtain by driver's seat to extend front of body and lap over front storm curtain, tacked on the inside of side top rail and extend to chassis frame. Two-inch hem on side and bottom of curtain. 20 in. by 21 in. pyraline light sewed in and reinforced. Curtains held in place by brass fasteners on front of post and front curtain. These curtains roll up and fasten with two straps, hooks, and rings. Front storm curtain to extend from hood to 4 in. below the top of dash, and to be the width of the hood. Four-inch hem on both sides and bottom. 40 in. by 21 in. pyraline light sewed in this curtain and reinforced.

2. All canvas to be special No. 95 Tan Textol, waterproof, and mildewproof, and all seams and hems to be double stitched, all same as in sample body.

Straps to hold litters in outside carriers.

Curtain straps with hooks in place of buckles.

Straps—leather—front and rear fastened to side board to hold lowest litter in place. Corrugated rubber on front and rear lower tier.

Irons to hold litters—upper tier curved.

Bolt and cotter pin to hold seat when turned back.

Painting

All wood work to be primed with a coat of pure linseed oil and lead and stand until thoroughly dry before the irons are put on the inside body. To be finished natural wood with three coats of varnish and to be thoroughly dry between coats and sanded. All other parts are to receive two coats of pure

lead and oil and all defects puttied and sanded. Then two coats of olive green, one coat of glaze, one coat of finishing varnish. Ample time should be given between each coat to dry.

Lettering

The letters "U. S." are to be laid on in aluminum leaf, full block letters, 4½ in. high with a 1-in. square period after each letter. All work to be done in a workmanlike manner.

Number of plate on body.

"Maximum 8 patients" placed on outside rail (Stencil).

Red Cross: in the second panel from front, lay on an 8 in. square of aluminum leaf. In the center of this paint a red cross, each bar 6 in. long and 2 in. wide. Then dry and varnish.

Caduceus: In the first panel, above "U. S." to have a Caduceus 6 in. high in maroon laid on aluminum leaf.

Blue Prints: Drawings of elevations, sections and minor details of the ambulance herein referred to accompany and form a part of this specification. They are to be considered in connection therewith.

Repair Body

The specifications of the repair body are to be the same as the ambulance body with the exceptions of drawers and work bench on interior of body. The chest of drawers, eight in number, (six only shown in blue print) (the upper two being made into four) is 21 in. high, 24 in. deep, and made to fit inside the body above the seat line. These drawers are made of ¾-in. maple and the top of the chest is made of 1¾-in. maple, as this is used for a tool bench. Between the seats at the bottom, another drawer is made of ¾ in. maple, which works in a frame to fit this space. When bodies are furnished for this purpose, the compartment, underneath the seat are made full width, the spring cushions are to be left out and loose canvas cushions furnished instead. The compartments underneath the seat and drawers are suitably divided into smaller compartments for carrying spare parts. Right and left hand sides front end of longitudinal seats to have base trap doors opening toward floor with hasp and staple. Left hand rear to be made without divisions and to have trap door under seat. Right hand rear to be divided into four compartments of equal size and to have trap door from top. The drawers are to be fitted with two drawer pulls, hasps, staples for padlocks, card holders on the outside of drawers. Ample space should be allowed in construction of drawers to admit of their being easily opened under variable weather conditions.

Specifications for U. S. Army Ambulance to Fit Standard Ford Chassis

1. General Provisions: The materials called for must be of the best and highest grades mentioned in the specifications, and the work must be thoroughly and faithfully executed in all its parts.

2. Inspection: The material and workmanship will be inspected as work progresses, by a representative of the Medical Department.

3. Lumber: Special care must be observed that all wood is well seasoned.

4. Unless otherwise distinctly stated in the body of these specifications the kinds of lumber used for different purposes will be as follows:

5. All wood stock used in the body proper, side posts, sills, rails and corner posts to be of ash of first quality. Side panels to be ¼ in. thick, waterproof "Vehisote" composition. Front end panel to be ¾ in. thick of same material as side panels.

6. Top bows to be of good quality ash or oak.

7. All cross bars front and rear sills to be of best quality hard wood (ash or maple or birch).

8. Side boards, cross bars to be reinforced by angle irons of best quality of steel and of sufficient strength to carry 100 per cent overload. All other irons to be of open-hearth soft American steel unless otherwise specified.

*This curtain is placed back of driver's seat. Rear curtain to be made of brown canvas tacked to rear head piece.

9. Best American soft iron for clips, bolts and rivets. All fastenings of steel or wood are required to be bolted, screwed or riveted to uprights.

10. Paints and oils of best quality of their respective kinds and strictly pure.

11. All side posts of first quality ash fastened to composition paneling with screws.

12. Water tank to be 20 gage galvanized iron with cap for filling and ½-in. spigot opening into tool box on the left side of body. Tank to be made of proper size, 5 gal. capacity, and suitable to fit in the panel below the side door on left side of body.

Body

1. Capacity: Three persons prone in the rear of driver's seat. Two litters on the floor of car and one carried on folding angle iron and hood rack in the center of the body. Driver's seat to be wide enough to carry two passengers in addition to the driver if necessary. Inside over all measurements of the body to be 7 ft. 6 in. long, 4 ft. high in the center and 4 ft. wide. Tail gate to be made of suitable hard wood 22 in. high, suitable pockets to be cut in same to allow litter handles to protrude, these pockets to be covered with canvas. Top of body to be slatted with ash slats with not more than 3 in. space between same. Floors to be of first grade yellow

(Continued on page 291)

2000 Miles of New Roads Needed in Central-Eastern Europe

U. S. A. Road Engineers and Motor Vehicle Manufacturers
Should Plan to Assume Major Tasks in After-War Recon-
struction Work—Larger Field for Trucks and Tractors

By E. A. Langdon

EDITOR'S NOTE—The following article embodies both a broad vision for future transportation development in Central-Eastern Europe, based on intimate first-hand knowledge of conditions, and a comprehension of the unusual opportunities awaiting the initiative of American road engineers and motor vehicle manufacturers. It was written by Mr. Langdon on his arrival in Denmark after a sojourn in Germany and Austria.

RECONSTRUCTION after the war will undoubtedly go hand in hand with a lot of construction work; that is to say, many countries which before the war were but slightly bound up with Western civilization will now find themselves intimately enmeshed in the net of international commerce. This opens up aspects of new fields for commercial endeavor of every kind on the part of such nations as will have passed through the war unscathed, chief among which stands, unless the situation become changed radically, the United States. Attention has been called before to several important groups of opportunities which will await American business in Central and Eastern Europe. The following remarks deal with a somewhat remote but no less important phase of the inevitable work of after-war organization of the forces of Europe.

Motor Vehicles for Transportation

There is no doubt in the minds of all well-informed parties on all sides in this war that transportation in the old world, aside from the work done by railroads, will be carried out principally by motor vehicles. As for the Germans, they are realizing this very clearly and are making very energetic preparations for the work due to become necessary in this direction. Very little is said about these matters, however, in the public press, for the double reason that the general public's attention is desired, by the Government, to be focused upon the immediate problems of war, and because these very preparations are expected to give the Germans a trump card at the negotiations which at some time or other must come.

Among the rich fields about to be opened to the commerce of the world the Near East—Balkan and Asiatic Turkey—stands foremost. It has been stated, and is herewith reiterated, that unless the fates of war should turn most decidedly against Germany, these regions will form part of a Central European sphere of influence clustering about Germany and Austria-Hungary. Poland, Scandinavia, Holland and Italy are expected to be in a cordial economic alliance with this system. According to German economists, these countries will be united by a customs understanding.

It is very simple to say that transportation in Eastern as well as the rest of Europe will be chiefly by automobiles. While transportation means will undoubtedly be required, yet the introduction of automobiles on a large

scale into these territories will become difficult and result in miscarried effort, unless the problem is illuminated and attacked from all sides at once. The principal point to consider, which at the present moment would render the wholesale introduction of motor vehicles to these countries problematical, is the scarcity of suitable roads.

Medieval Methods in Use

Both in the Balkans and in Turkey, transportation has been, with very few exceptions—the railroad net is but thin, and the number of automobiles is small—by horse, mule and ox teams. The live stock decimated by the war, the need of transportation means will leave open the question of choosing modern appliances instead of old-fashioned ones. If, however, automobiles should be introduced in numbers, without the suitable roadways for their use, the poor results obtained by the owners would undoubtedly drive these countries back quickly to the old method of draught animals and retard the development of the automobile in these regions considerably.

Four Principal Systems

The need of roads being understood, the most striking opportunities for road builders will now be taken up in turn. Aside from Rumania, which has already been opened up in part, four important systems of roads to be constructed suggest themselves to the critical observer, as follows:

1—**MONASTIR SYSTEM**—The city of Monastir, in old Serbia, is perhaps the most prominent central point of the Balkan peninsula, when political considerations of capitals, etc., are ignored. It lies centrally among all the important points of the Balkans, being approximately 150 miles from Avlona, 175 miles from Scutari, 200 miles from Sofia, 130 miles from Saloniki and 170 miles from Larissa. The territory is mountainous throughout, resembling, except in point of height, the Rockies. Here are about 825 miles of real, serviceable road to be constructed.

2—**SMYRNA SYSTEM**—Smyrna, the most important port of Asia Minor, and, for that matter, of Turkey, is bound to grow in importance, as the Berlin-Bagdad railroad opens up the interior of the Ottoman Empire. Smyrna is separated from the railway by at least 250 miles, Karahissar, the nearest railroad point, being that distance from the port. Smyrna has always been an important Levant port; but if German predictions, though taken with a grain of salt, are to come true, the future of this city will rival the position of Marseilles. The need of a first-class modern highway connecting the city with the chief artery of traffic of Turkey is self-evident. The country is flat, except for two mountain chains, and should offer no special difficulties to modern trained road builders.

3—**TREBIZOND - KHARPUT - ALEPPO SYSTEM**—Whether Trebizond remains in the hands of Russia or is

restored to Turkey, it will remain an important center of the Caucasian region which, with proper efforts, is bound to be developed into a very rich country. The nearest, quickest and cheapest connection, providing proper means of transportation exist, would be a road to Aleppo, 550 miles away. This distance covers an almost straight line and cuts the Bagdad railway twice, first at Kharput and then before entering Aleppo. This road, too, would serve to stimulate trade and industry in a very intense manner. The topography of this prospective road is more difficult; the mountains are more general and higher than in Asia Minor; and the work would undoubtedly be expensive.

4—TABRIZ-MOSSUL SYSTEM—From the capital of Northern Persia, situated at the Urmia Lake, the road would have to lead around the latter, in a straight line toward Mossul on the Tigris, where the Bagdad railway bends toward west. The territory in this case is a high plateau which gradually declines until it reaches the Mesopotamian plains. The distance, as outlined, is about 350 miles. A road such as this would establish an intimate connection between Turkey and Persia.

Thus, there is need of about 2000 miles of modern roads, which would mean millions to enterprising constructors.

Remembering the points brought out in an earlier article regarding automobile exports to Germany after the war, American entrepreneurs interested in the work of constructing such roads as suggested above should follow a similar course as that referred to in the article above mentioned. There should be well organized co-operative effort, careful planning and speedy, efficient execution. Of course the work will be at least as difficult as that of selling automobiles to these territories. The Germans are planning to have first preference in the trade of the Near East after the war; and they will take

great care to see to it that they will be able to maintain and, if possible, strengthen their position in this region. So, after decades of international concessions to all the powers, Turkey will re-enter the world's market, but freed of all "capitulations"—i.e., the agreements giving the Powers great rights and no obligations, which agreements were renounced by the Porte prior to her entrance into the war—and embodied in an efficient system of German paternalism. In a lesser degree the same will apply to the other members of the Central European federation which Germany has already begun to organize during the war. Therefore, advantages of trade in the German sphere of influence will have to be bought by trading with the empire. Mention has been made already of certain German plans regarding the peace negotiations, and from what may be gathered from occasional hints by influential personages, it seems that the "open door" in the Berlin-Bagdad empire is to be maintained only if Germany is granted equal privileges in the Far East, South America and the Asiatic colonies of the British Empire.

It follows, from all these considerations, that when the time for negotiations and the resumption of trade arrives, American automobile and road interests should have definite plans ready to put before the representatives of the country at the conference. Without telling anything but a public secret, it may be stated that German interests in these lines expect Americans to do this very thing; and if these organizations in the United States fail to realize their opportunities, the German car and road makers will be the last people to regret it.

American road, vehicle, part and accessory makers should unite for combined effort in after-war Europe. But as efficient organization is not a thing which can be built up in a day or a week, this work should be undertaken at once, without delay.

Specifications for U. S. Army Ambulance to Fit Ford Chassis

(Continued from page 289)

pine flooring. A side door 14 x 20 in. to be provided in each side of the body directly back of the driver's seat. Said door to be securely hung on two hinges. Provide a slatted seat 36 in. wide in each side of the body immediately back of the driver's seat, these seats to fold up when not in use. A mud guard to be provided on both sides of the car running the full length of body.

2. Bottom frame work: A 1½ in. x 1½ in. x ½ in. angle sill on each side of the body on the ends of the cross sills. All cross sills to be also reinforced by ¾ in. x ¾ in. angles. Tail gate to be fastened to the rear sill by two wrought-iron strap hinges.

3. All studs and posts to be of ash 1¼ in.

4. Top slats to be of ash 1¼ x 5/16 in. nailed to bows 1 in. apart around bend, and 3 in. apart over the flat part of top.

5. Six ash or oak bows ¾ in. x ¾ in. halved and screwed to the horizontal side rails of the body.

6. Paneling on side of driver's seat, all medicine and tool boxes to be of basswood, poplar or ash. Each of the tool boxes to have a padlock.

7. Step on rear tail gate to be of 1 in. angle iron around the center pocket.

8. Litters when folded to be carried on the floor held against the sides of the body by an iron at the front end and the tail board pocket in the rear.

9. The front panel to be protected from the handles of the upper litter by two 20-gage steel plates, each held in place by four wood screws.

Trimmings

1. Cushion for driver's seat to be made in 2 pieces, pad style, and covered complete with black imitation leather.

2. Curtains to be made of Tan Textol, waterproof, and mildew duck.

3. Curtains on each side of driver's seat to have suitable size celluloid lights and to be fastened securely by brass grommets and curtain fasteners. Curtains to be hem stitched all around. All edges around the lights to be carefully sewed back to prevent ravelling.

4. Cover over driver's seat to be supported by a standard Ford top bow and sockets. Curtain in front of driver to be held in place by two webbing straps and fastened to the side curtains and cowl with grommets and curtain fasteners.

5. Curtain in the rear of the car to have a pocket of sufficient size to cover the handles of the upper litter.

6. Hand straps to be provided on the roof of the car in such a position that the patient in the upper litter can reach them conveniently for support. Provide 3 webbing straps on the right-hand side of the body to hold one extra tire. Provide webbing straps inside the body to hold upper litter rails against the side of body when not in use.

All wood work to be primed with a coat of oil primer colored to make a background for the finished coat. Outside to be painted one coat of olive green, inside one coat of dark cream color. All iron work to be japanned two coats. All paint to be a good outside water-proof paint.

In the panel of each side door place a caduceus 6 in. high in maroon, laid on a background of aluminum leaf. In the center of the second panel 2½ in. from the top rail place a Red Cross 8 in. square on aluminum leaf. Each bar of cross to be 6 in. long and 2 in. wide. Four inches below this 8 in. square the letters "U. S." are to be laid on aluminum leaf. Full block letters 4½ in. high with a 1 in. square period after each letter. All work to be done in a workmanlike manner.

Thermostat Controls Radiator Shutter

CONSTANT engine temperature is effected on the new Columbia sport model by the use of radiator shutters automatically controlled by a Sylphon thermostat placed in the water return line. Neither the shutter nor the thermostat is new, as hand operated shutters and thermostats controlling the amount of water passing through the waterjackets of the engine have been in use for some time. The application of the thermostat to shutter control is, however, new.

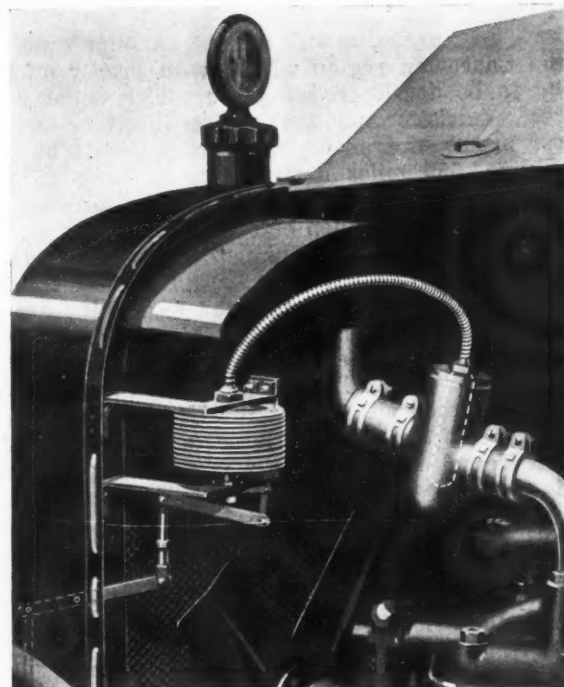
In adapting the thermostat to shutter control, a division into two parts was necessary. The first comprises the usual expansion drum, which is forced open by the action of the gas formed by heat from the contained liquid, operating the shutter through a system of levers. The second part is a thin copper tube, containing the sensitive liquid, and is held in an iron housing placed in the water return line.

Operation of Thermostat

At temperatures under 140 deg. Fahr. the thermostat is inactive, and the shutters are held closed, permitting little air to pass through the radiator. As the engine warms up, and approaches a temperature of 140 deg., the liquid in the return line container starts to change into a gas, creating a pressure upon the expanding drum, causing it to operate, and to open the radiator shutter. This opening action is continued until an engine temperature of 180 deg. is reached, at which temperature the shutter is entirely open. Any variation in engine temperature affects the thermostat, and the shutter is automatically shifted to meet the new conditions.

A Boyce Moto-Meter is an essential part of the equipment, and shows the driver at all times that the temperature of the engine is being properly regulated, and that no dangerous temperatures are being reached.

In addition to the increased convenience obtained by this method of shutter control, it is stated that a marked increase



Sylphon thermostat control for radiator shutter on Columbia sport model

in engine efficiency and economy is effected by this device. High engine temperatures are essential to good performance with the present day low grade fuels, and this is possible with this installation, without the possibility of overheating.

The thermostat is manufactured by the Fulton Co., Knoxville, Tenn., and the shutter by the Detroit Motor Appliance Co., Detroit.

Sunderman Manifold Permits Use of Kerosene

FOR burning kerosene, the Sunderman Corp., Newburgh, N. Y., has brought out a manifold which can be attached in place of the standard gasoline type of intake and exhaust. The manifold is intended to give complete vaporization of the kerosene and experiments have just been completed in the Detroit laboratory of the Sunderman Corp., which have satisfied the concern in the manner in which the heavier fuels have been handled.

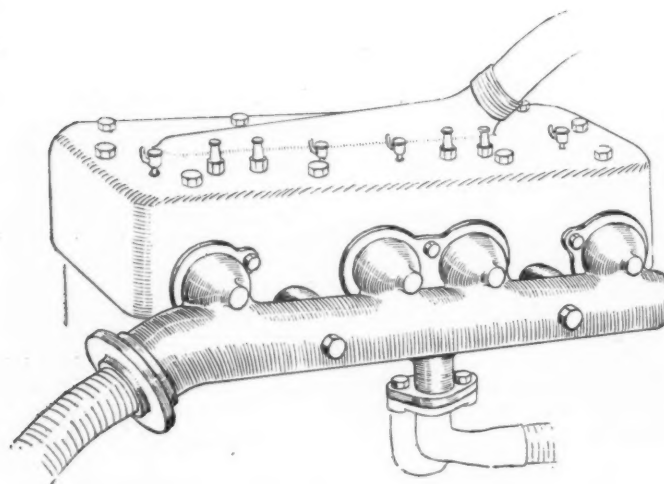
The engine is started on gasoline and after opportunity has been given to warm up, the engine is switched over to the kerosene fuel. Experiments from a cold start, timed by a representative of THE AUTOMOBILE AND AUTOMOTIVE INDUS-

TRIES showed the engine running on kerosene after about 1 min. of preliminary warming up.

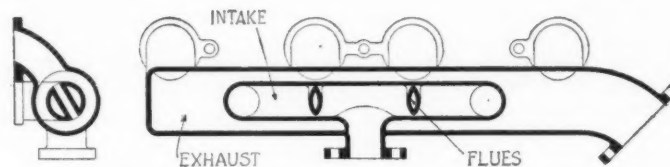
From the accompanying sketches it will be seen that the heating takes place after the mixture has left the carburetor and is in the manifold quite close to the cylinder. The reason for this is two-fold, first on account of the loss of volumetric efficiency which invariably results from pre-heating the air to a great extent, and, second, because of the practical elimination of the condensation element by having the pre-heated mixture enter the cylinder almost immediately after pre-heating takes place.

In other words, it has been found by experiment on this manifold that the best results are obtained when the mixture is pre-heated as near actual entrance into the cylinder as possible. Another feature is the use of the flues which carry the hot exhaust gases directly into the center of the intake passage thereby warming the intake flow throughout its section instead of merely at the point of contact with the inner skin of the heated wall of the intake.

The manifold was fitted to a Detroit car, equipped with a Golden, Belknap and Swartz, 3½ by 4-in. engine and driven to Fremont to the tractor exhibition and was reported to have given satisfactory performance over the roads. It will be fitted to one of the tractors at Fremont and tested from an agricultural standpoint.



Manifold for burning kerosene replacing standard type



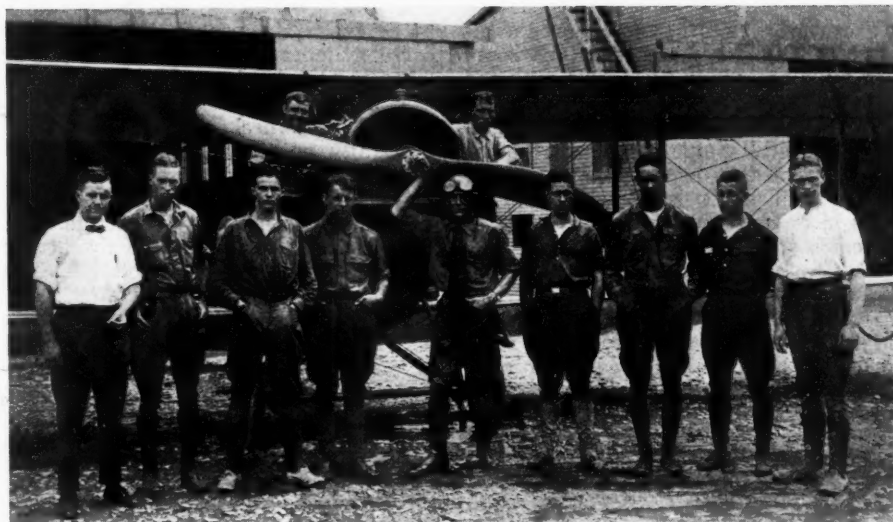
Section through the Sunderman manifold for burning kerosene

A New Aviation Training School

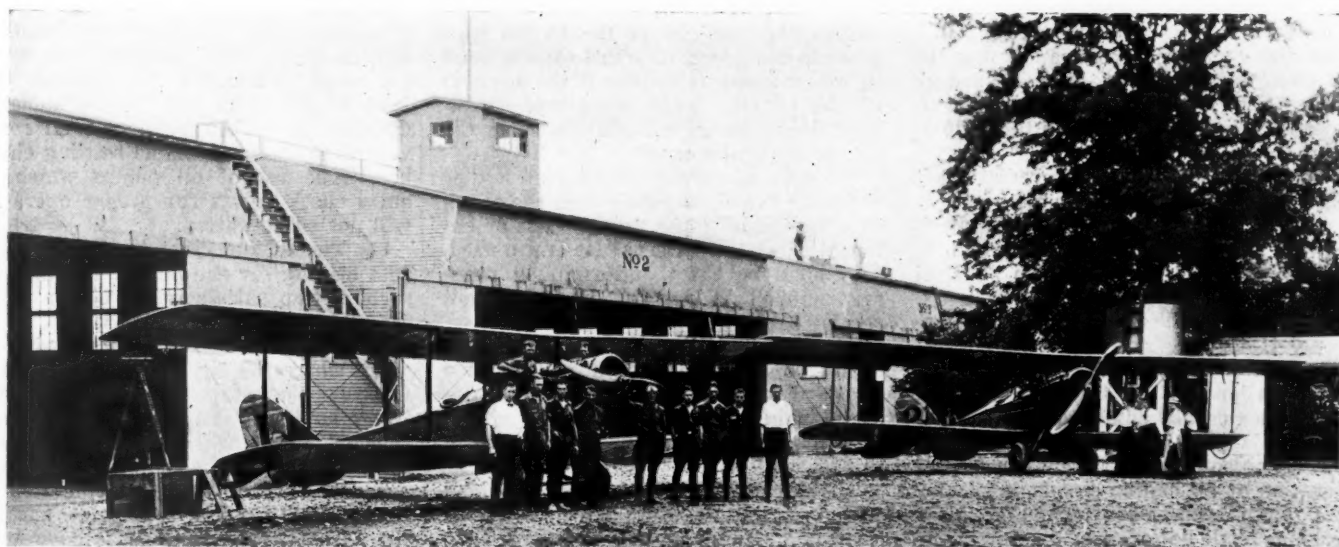


One of the Curtiss tractors used at the Claymont Aviation School

A SCHOOL for training students in aviation has been established at Claymont, Del., by Pierre S. du Pont, Irene du Pont and John J. Raskob, which they maintain at their own expense to aid the Government in its efforts to develop an efficient and highly-trained aviation corps. All details of aircraft engineering are taught the students, who are for the most part college men, as well as the practical operation, adjustment and repair of machines of various types, including hydroplanes. Harry Atwood, the well-known aviator, is in charge with Thomas Birt, formerly a lieutenant in the Royal Flying Corps, as his assistant. Equipment of the school includes two Curtiss tractors, a Thomas flying boat and a Thomas tractor. The training course covers 2 months, with instruction in maneuvering, map-making, photography, gun-range work and scouting.



Student aviators at the Claymont School lined up before the hangars. Most of them are college men. Instructor Birt is in the center with his hand on the propeller hub



Hangars at the Claymont Aviation School established by Pierre S. du Pont, Irene du Pont and John J. Raskob at Claymont, Del. The group of students illustrated above is shown. Two of the three tractors used by the school appear, the one at the left belonging to Instructor Birt and the other being used by the students

Specifications for 55-Hp. Track-Laying Type Artillery Tractors

Part II

Instructions to Bidders and Special Specifications Governing Manufacture Prescribed by Ordnance Department of U. S. Army

CAM SHAFT.—The cam shaft shall be constructed of S. A. E. steel No. 1020 or its equivalent. The cams shall be either case hardened and ground or of chilled cast iron and ground. The cams may be forged integrally with the cam shaft or they may be separately attached to the shaft by keying and pinning. The bearing shall be of such size as to permit the shaft to be removed without removing the bearings or the bearings must be readily removable with the cam shaft.

65. The cams shall be designed and ground to such shape as to secure quiet operation of the engine and maximum torque, and shall have wide bearing faces in order to prevent undue wear of the cams or valve lifters.

66. *Cam-shaft Bearings.*—The cam-shaft shall be provided with not less than three bearings for a four-cylinder engine. The cam-shaft bearings shall be of the best quality phosphor bronze or equal bearing metal. They shall be provided with an effective means for securing a proper circulation of oil through the bearings from the pressure oiling system.

67. *Gears.*—The cam-shaft gear may be of cast iron, but the smaller gear on crank shaft and on magneto and pump shaft must be of steel. These gears must be machine cut, and all gears accurately adjusted to a quiet running fit under load. They must also have sufficient width to insure long wearing life. The cam-shaft gear connection may be adjustable in order to permit proper valve timing, but must be provided with suitable means for retaining the adjustment.

68. *Crank Shaft.*—The crank shaft shall be forged from a single piece of steel, equal in quality to S. A. E. specification No. 1045, and heat treated to develop the following minimum physical properties:

Brinell hardness, 250-275 (sclerometer, 41-45).

Reduction of area, 45 per cent.

Elongation in 2 in., 16 per cent.

69. The crank shaft shall be sufficiently large in section in all points to prevent objectionable torsional or lateral vibration at all engine speeds and loads.

70. Both crank bearings and main bearings shall be large in area in order to give low bearing pressures and long bearing life without replacement or adjustment. The crank shaft shall have not less than three main bearings for a four-cylinder engine.

71. The crank pins and main bearings of crank shaft must be ground to a high finish and a total tolerance of 0.0005 in. for diameter.

72. Suitable means must be provided for preventing cylinder oil from creeping out of the crank case through the end bearings, and all other parts of the crank case; and provision must also be made to retain proper lubrication for each cylinder and crank-pin bearing when the tractor is working on a 15 per cent grade.

73. The flywheel flange must be forged integrally with the crank shaft. This flange must be large in diameter and so designed as to secure an accurate centering of the flywheel on the flange. The bolts used in fastening the flywheel to crank shaft shall be of suitable diameter, and of material equal to S. A. E. specification No. 2330 or No. 3130, properly heat treated to give an elastic limit of not less than 80,000 lbs. per square inch, reduction of area of 55 per cent minimum, and an elongation of 18 per cent in 8 in. minimum. For inspection purposes these bolts must have a scleroscope hardness of not less than 35 or more than 42. If the bolts take the driving strain, they shall be of large diameter, and tightly fit in reamed holes in both members.

74. The crank case may be divided in a horizontal plane, in which case all bearings must be carried in the upper section. It may be of the barrel type made in one piece, in which case it must be so arranged as to permit the removal of the pistons, piston rods and crank-shaft bearings through handholes in the side of the crank case.

75. All oil pipes shall be either pressed or cast integrally with the crank case, or the oil pipes may consist of external leads. If external leads are used, they shall be short and rigid or properly clipped to prevent vibration and chafing.

76. The oil-settling chamber on engine must be provided with a suitable threaded plug for draining. The use of a drain cock will not be permitted. Plug must be attached with chain swivel to prevent loss.

77. The crank case shall be provided with two telltale cocks to show maximum and minimum safe oil levels.

78. All joints or connections in crank case shall be made thoroughly oil tight.

79. The main shaft bearings shall be of the best quality bearing metal and provided with the proper oil grooves.

The bearing caps shall be of proper design, and made of material suitable for the purpose. These caps shall preferably be held in place by means of alloy steel bolts of proper size with castle nuts, with suitable cotter pins. Not less than three main bearings shall be provided in a four-cylinder engine.

80. The main crankshaft bearings and the connecting rod bearings shall be finished to an accurate bearing surface.

81. The main and crank-pin bearings shall be provided with metallic shims, some of these shims in each bearing being not more than .004 in. thick.

82. *Oil Capacity.*—The oil reservoir of engine must have sufficient capacity for lubricating oil to permit the tractor to run fully loaded a distance of not less than 60 miles over ordinary roads without replenishing the supply of oil.

83. The oil filler and breather tubes on crank case shall be provided with a non-removable, fine mesh, brass screen, and also another screen of same construction which is removable. The filler-tube cap shall be hinged and provided with a spring which will hold it in the closed position. This cap must not permit the entrance of water, and must also have a sufficiently large opening to properly vent the crank case. No other breather will be permitted.

84. *Lubricating System.*—The engine shall be lubricated by an oil-pumping system. The oil pump must be positively driven and provided with suitable screens of not finer than 30 mesh, which are readily removable for cleaning. The inlet to oil pump must be of sufficient distance above the bottom of oil reservoir to provide a suitable settling chamber. The use of oil pumps which require check valves for proper operation will not be permitted.

85. The engine must be given a full-rate loading for one hour and shall pass such a test satisfactorily before being assembled into the tractor.

86. *Suspension.*—Preference will be given where the engine is mounted with a three-point suspension or on a sub-frame having a suitable three-point suspension which will effectively prevent the distortion of the frame from straining any part of the engine, clutch or transmission. If a four-point suspension is used, the engine must have arms and be mounted on as narrow a frame as possible.

87. The motor must be arranged to be started from the flywheel. No other starting wheels will be provided.

88. *Governor.*—A centrifugal type engine-speed limiting governor of approved make shall be provided and adjusted so as to prevent the tractor from exceeding a speed of 3 miles per hour on direct gear. The governor shall be adjustable.

89. *Armored Covering for Engine and Gas Tank.*—Some of the tractors required will be equipped by the Ordnance Department with armored plate over the motor, and also over the gasoline tank, and the frame of each tractor must be provided to receive this armor in accordance with the designs of the Ordnance Department, and all bolt holes for attaching the same be jig drilled to insure interchangeability.

90. *Carburetor.*—The carburetor must be of such design and provided with such heating devices as will enable it to use the grade of gasoline described below:

The gasoline shall when distilled by the standard method show the following characteristics:

(a) The temperature read when 20 per cent has distilled shall be not less than 221 deg. F.

(b) The temperature read when 60 per cent has distilled shall be not less than 293 deg. F.

(c) The temperature read when 90 per cent has distilled shall be not less than 356 deg. F.

(d) The dry point or highest temperature registered by the thermometer at the end of the distillation shall be not less than 428 deg. F. The engine must operate with gasoline of the grade mentioned above, with satisfactory economy and regularity at all speeds and loads.

91. The carburetor shall be adjustable with means of richening the mixture for starting, but this means shall not consist of changing the needle valve nor of flooding the carburetor by means of the float. A suitable drain cock must be provided at the bottom of the float chamber. The use of aluminum in the construction of the carburetor will not be permitted. A hot stove attached to the exhaust pipe or manifold must be provided and connected with main air intake of the carburetor by a flexible metallic hose of suitable size. The length of connection between the carburetor and the intake ports of the engine must be reduced to the minimum.

92. *Dust Collector.*—A dust collector of suitable design and construction must be installed and connected with the carburetor main and auxiliary air intake. It must be readily accessible for cleaning, and the connection on the end of this pipe must not reduce the effective area of the pipe at any point.

93. A muffler must be installed of substantial construction and so located that no part of it shall come above the top of the other mechanism on top of the cylinders. The discharge from the muffler shall be horizontal and at the bottom of the tractor, but not low enough to reduce the main ground clearance. The muffler shall be capable of reducing the noise of the exhaust to a negligible amount, but at the same time shall not cause any appreciable loss of power.

94. A suitable galvanized-iron tank

shall be provided having a capacity of not less than 45 gallons. A deep sump must be provided to catch water and dirt, and a half inch petcock shall be provided by which this sump can be drained. A vertical partition shall be provided at the center of the tank high enough to provide a capacity of 6 gal. in each of the resulting compartments. A gasoline line shall be run from each of these compartments to a three-way valve from which a single line shall lead to the carburetor. In the connections between the gasoline tank and the three-way valve cock shall be installed a screen of 30 mesh for straining the gasoline; the screen to be arranged for convenient removal for cleaning. The attachment of all fittings to the tank must be extremely secure to prevent leakage due to constant vibration of the machine. The tank must be provided with an air vent so arranged that gasoline will not slop out under any conditions of road travel.

95. The gasoline pipe line shall consist of thoroughly annealed brass or copper seamless tubing, not smaller than $\frac{3}{8}$ of an inch outside diameter, suitably fastened at intervals to prevent vibration or chafing. The piping shall be so arranged as to drain completely either the tank or the carburetor. All fuel pipe connections are to be S. A. E. standard fittings.

96. Suitable means must be provided for draining the gasoline from a flooding carburetor on to the ground without permitting gasoline to get into engine shield or to accumulate on chassis.

97. The gasoline system is to be equipped with a vacuum supply system of such a construction as will be acceptable to the Ordnance Department. The gasoline tank must be mounted on the frame in such a way as to prevent straining the tank by frame distortion.

98. *Cooling System.*—The cooling water must be pump-circulated and the system must be so designed that it can be completely drained by opening a single drain cock. The drain cock must have a free opening not less than $\frac{3}{8}$ in. in diameter, and be located in such a position as to permit the water to run directly into a bucket placed under the drain cock. Thermo-syphon system will not be acceptable. The water pump must be of such design as to permit thermo-syphon circulation in case of pump failure. The use of the gear type of pump will not be permitted. The water pump shaft passing through packing gland must be of bronze.

99. The radiator must be of such design as to insure uniform and free circulation of water, and mounted in such a manner as to prevent damage to radiator by severe vibration or twisting of the frame. It must also be readily repairable without special equipment. A tie-rod with universal connection at the radiator end must be fitted.

100. The radiator shall be of the fin and tube type with cast upper and lower headers. Either an overflow pipe must be provided or a vent in the radiator cover.

101. *Radiator Hose.*—The connections

for the hose on both radiator and engine must be not less than 2 in. in length. The upper radiator hose must be non-collapsible; the lower connections between the radiator and the pump shall consist of a piece of $1\frac{1}{4}$ -in. gas pipe 10 in. in length, connected with short pieces of hose at each end to the radiator and the pump. This pipe is provided for the attachment of a heating lamp when required for keeping the cooling water from freezing.

102. A fan must be provided of adequate capacity and housed in a shroud, which shroud shall contain the entire rear surface of the radiator. The fan belt shall be at least 3 in. wide and provided with a spring take-up, consisting of an idle pulley held against the loose side of the belt by spring pressure. The fan itself must be mounted on a fixed and rigidly supported spindle.

103. The lighting of the trucks will consist of two oil headlights equal to Dietz Tourist, and the tail light equal to Dietz Royal. Suitable brackets must be provided, with dimensions to receive the above lights. If required, an electric lighting system per Ordnance Department requirements, will be installed at reasonable cost.

IGNITION

104. The ignition system shall consist of a high-tension magneto with impulse attachment for starting. The high-tension magneto shall be so designed and constructed as to give minimum spark lag at all engine speeds. The opening of the primary circuit will not be permitted. The magneto must be readily controllable from the driver's seat. The range of spark-advance shall be not less than 30 deg. of crank angularity.

105. If the high-tension magneto or generator is coupled to a drive shaft, two universal joints or a flexible coupling must be used in the driving connection, in order to prevent binding of bearings. The flexible coupling, if used, must provide for parallel and angular displacement.

106. The sector for spark-advance lever must be plainly marked to indicate advance and retard positions.

107. Complete details of the construction of the magneto, with drawings and illustrations, must be submitted with other required data.

108. The wiring cable shall be constructed and tested in accordance with the latest recommendations of the Society of Automotive Engineers, and all ignition wiring must be protected from oil and water and so mounted as to prevent chafing.

109. *Spark Plugs.*—The spark plugs shall be constructed in accordance with the latest recommendations of the Society of Automotive Engineers, and the large hexagon type of shell provided with a single sparking point shall be used. The spark plug shell throat below the shoulder shall be $\frac{7}{8}$ in., 18 threads to the inch.

110. The insulator of this plug must be constructed of the best grade of selected mica, suitably wound.

(To be continued)

AUTOMOBILE and Automotive Industries

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Demonstrating Tractors

THERE will not be any more national tractor demonstrations such as were held in Fremont last week. The only verdict that can be passed on them is that they were a failure. The tractor was not made to extend itself, to show in these war days what it really can do. It would seem from the way in which the trials were conducted that the rules were intended to conceal the weaknesses of the machines. There was not a single thing done that would tend to eliminate the weak and give due merit to the good. By allowing each machine to go just about as it pleased, each maker set up his own standard of performance. Naturally, he knew the mechanical limits of his machine and saw to it that the operator always kept well within those confines.

There should be trials next year and they should be of that strenuous, eliminating kind that picks out and gives prominence of the reliable design and exposes the weak, many of which are literally parasites existing on the strong. The tractor industry is as much in need of such trials as was the automobile industry as far back as 1906 and 1907 when the first technical tests were held, when cars had to go 200 miles per day at an average of 20 m.p.h. and when every part was sealed and penalties were imposed for every bit of work done from start to finish of

the test. Those were history-making days for the automobile. Many were the long-distance night telephone calls to factories advising the factory of weaknesses and suggesting that manufacturing plans be changed immediately and better designs used.

The tractor needs such a test. There will scarcely be any other time in tractor history when such a test will be more needed than next year. It was needed this year. These are days when new firms are literally rushing into the tractor field. New designs will be coming out every month. The strenuous test is needed to show up good and bad points in design. Such tests will work wonders. They will crowd the development of a score of years into a few. They will result in the quick and just elimination of those designs that have no right to assist.

Unfortunately too many firms in the tractor industry are under the domination of the inventor. The inventor has his place, but too frequently he is warped in the broad perspective, and fails to survey the entire field. His own invention is unduly magnified. To him it is the panacea of tractorism. We had such inventors in the automobile field. They did good but generally had to be let out. It was almost impossible for a factory to get into production and retain the inventor. So will it be with the tractor. Unfortunately, the inventor will have to be eliminated. Severe technical tests will show up the merits or weaknesses of his hobbies and instead of imposing on his company for years it will be possible to remove the beam from their eyes.

Gasoline Supplies

FIRST from a high official of the Standard Oil Co., and second from Van H. Manning, Director of the Bureau of Mines, announcements have been given to the daily press hinting that the needs of the Government may curtail the supply of gasoline available for private use. Both these announcements appeal to automobile owners to limit their use of gasoline in order to conserve the supply.

There is a great deal of mystery about gasoline resources. First, as to export, it is not conceivable that much more can be sent abroad, because the limiting factor is shipping and oil tankers cannot be built at a rate sufficient to affect the total quantity of oil available in America to any great extent. Probably the real situation is that the domestic demand for gasoline is so very close to the limit of production that a very little extra needed for Government purposes will tip the scale of the balance; so that the consumption will just exceed the possible supply.

Three Possible Solutions

There are three ways to meet this condition. One is to restrict usage of automobiles, another is to increase the gasoline output and the last is to still further debase commercial gasoline by the addition of more of the heavy ends.

Now it is apparently impossible to increase the gasoline output in proportion to the demand, to restrict the use of any sort of motor vehicle is only to be thought of as a last resort, for it is neither desira-

ble nor would it be easy, except by raising the price of gasoline to a prohibitive figure. The third alternative, the debasing of gasoline, is not conservation, because, though engines will run on still poorer fuel than they are getting to-day, they will run badly and wastefully. We are at present wasting a large part of the fuel that passes through automobile engines and to debase the fuel would mainly result in an increase of the waste.

Price Increase Most Probable

Thus, of the three possibilities, a rise in price seems the most probable, and the way to get the price down again after such a rise, is for engines to be built to handle heavier fuel. It is difficult but it is not impossible. The matter is strictly one for the manufacturers to handle; they depend upon a fuel of which the stock is practically inexhaustible, but they are only using a small fraction of that fuel and discarding the bulk as unsuitable. It must be made suitable.

Differentials and Mud

THE primary fault of the differential for machines which have to be driven over surfaces which are liable to be very soft in places is the spinning of the wheel which has least traction. Most of the modern differential substitutes have been designed with the idea of preventing this spinning by introducing friction as soon as the differential action becomes violent.

Now, this is merely equivalent to putting a brake on the spinning wheel, so might there not be a possibility in some device which would allow this to be done manually? Suppose, for instance, that the emergency brake lever were arranged in such a manner that it would normally apply both rear wheel brakes, it would not be difficult to arrange some sort of catch which would allow either one or the other to be dropped. Then if stuck in a mudhole the catch could be set over so that the spinning wheel could be held without putting any restraint upon the other.

Admittedly such a scheme would be a makeshift, but seeing how seldom a truck or passenger car does get stuck it might be a makeshift well worth while. To work out the detail should not be difficult, nor should the attachment add much to the cost of the chassis.

Abandoning Bluff

THE successful burning of kerosene in tractor engines has or has not been accomplished according to the individual understanding of "successful." Most any tractor will run on kerosene, and nearly all are being sold as kerosene-consuming machines, but a morning spent in the field watching a few score tractors at work gives an idea of how "successful" the kerosene combustion is. The fact is that nearly all tractors will run for a time on kerosene and that a few will run fairly well on this fuel. None will run as well on kerosene as on gasoline and very few run even well enough for the use of

undiluted kerosene to be entirely wise on the farmer's part.

First, if the exhaust is pale blue and has an acrid flavor and an effect on the eyes even when encountered in the open, the combustion must be so faulty that the fuel economy will be extremely poor. Second, the same conditions mean rapid deposition of carbonaceous products in the cylinders and the defiling of the lubricating oil. Altogether, it is doubtful whether the average tractor would not cost less to run on gasoline than on kerosene, if the total cost of a year's operation is considered.

The few tractor engines that do seem to assimilate kerosene nearly as well as gasoline have been specially designed with that end in view. They are not gasoline engines with kerosene attachments, but kerosene engines from the ground up. They have different manifolding, different compression ratios and so on.

It is being realized that it is not enough to claim kerosene fuel ability when that claim will be discounted by the farmer; that it is wrong to tell the farmer that a tractor will do something which it cannot do without trouble resulting. But it is too late to retract, the machines which are supposed to run on kerosene have got to be made to do so, and in any case it is essential that proper means for using a cheaper fuel than gasoline be discovered.

The problem is one that engine designers and kerosene carbureter experts have got to work out together. Neither can make progress without the other, and just now the engine man is the laggard. There will be many new engines next year, unless present indications are altogether misleading, and the real success of the few suggests that the kerosene problem is to be solved, without great difficulty, by the many if only co-operation is full and free.

Steel Wheels

ONE of the industries which will be the hardest pressed, if the army requires the 70,000 trucks which have been mentioned, will be the steel-wheel business. There has always been difficulty in obtaining good cast-steel wheels, not excessively heavy, in fact the European supply before the war came from a very select group of foundries. Yet there seems to be a general agreement now that the wood wheel for trucks is doomed.

It is rather remarkable that so little progress has been made with stamped wheels, either in America or Europe. The steel pressing seems so eminently suited to wheel manufacture, and modern developments in the arts of acetylene and electric welding have led to the publication of a host of ideas which look good on paper and in experimental form.

Probably one of the troubles is the very considerable cost of experiment when big presses and large dies are a requisite, but this should not affect some of the wealthy firms who have suitable plant. The pressed-steel truck wheel deserves a thorough try-out on a large scale, and some day some manufacturer is going to make a great success with a wheel of this character.

News of the Automotive Industries

One Motorcycle Show Only

In Chicago Latter Part of February—Cycle Assn. Pledges Help to U. S. Government

ATLANTIC CITY, Aug. 10—Probably the most important decision reached at the meeting of the Motorcycle and Allied Trades Assn. which was held here on Wednesday in connection with the general convention of the cycle trades was that to hold one motorcycle show during the coming year. It has been customary in recent years to hold two annual shows, one in the east and one in the west, but owing to the war and the trade conditions resulting therefrom it had been the general opinion that no show would be held this year.

Motorcycles Used Commercially

The meeting was held on the tenth floor of the Traymore Hotel and was called to order at 9.30 a. m. by President C. W. Henderson. Mr. Haws, of the Firestone Tire & Rubber Co., who is chairman of the Dealers' Committee, spoke of the possibilities of the motorcycle for commercial use. He said that there was a wonderful field for the motorcycle in commercial applications, to which his attention had been called by the widespread use of the machine by the dealers of his company for quick delivery work. Mr. Haws issued a warning not to overload these vehicles, as constant overloading would render them inefficient. It should always be borne in mind that they were purchased for special delivery work and they should not be used for service for which a truck was more suitable.

The Minute Man Campaign

Next Secretary Perkins delivered his report, in which he outlined the motorcycle minute men campaign. This was conducted from the New York office for the purpose of educating civilian motorcycle riders in the duties which would be assigned to them in case they were called to service in the regular army. Reference was also made to the National Gypsy Holiday Tour, held on June 16 and 17 last, when approximately 20,000 motorcycle riders toured all over the United States. The object of this tour was chiefly to promote sociability among motorcycle riders. The country was divided into six sections and a representative of each of the leading motorcycle factories was appointed district

manager in charge of one section. These district managers in turn appointed local tour managers, who with the help of the district managers organized local tours. Wherever possible the tours were so arranged that a number of them converged at central points, with the result that in some instances thousands of motorcyclists were brought together at a single point. Each tourist received a bronze medal as a souvenir of the tour, and the association, in acknowledgment of the special services rendered, donated a silver medal to each tour manager. This Gypsy holiday tour is to be an annual affair hereafter.

Military Activities Outlined

Mr. Perkins also outlined his activities in connection with the organization of the military motorcycle standardization committee which is now sitting under the chairmanship of Mr. Hanks and developing a standard design of motorcycle for military use. Some work has also been done by the association's officers toward the elaboration of a system of universal service from motorcycle dealer to rider. A dealers' association is now being organized in the territory comprising Greater New York, Northern New Jersey and Westchester County.

Frank Weschler of the Hendee Mfg. Co. brought up the question of shows and pointed out the importance of holding at least one motorcycle show during the coming year. This, he said, should be held in the Coliseum in Chicago.

George Briggs, chairman of the membership committee, then read his report, showing that a number of new firms had joined the association since its last meeting.

(Continued on page 302)

Ford Plant Value Raised \$35,000,000

DETROIT, Aug. 13—The state board of review in Highland Park has raised the value of the Ford plant \$35,000,000 above the township board rating. The township board rated the plant at \$42,500,000 and the state board raised it to \$77,500,000. The board also raised the township board's valuation of the Dodge plant from \$7,500,000 to \$13,000,000.

Capt. Britton in Charge of Army Truck Design

WASHINGTON, Aug. 15—Captain Britton is in sole charge of designing standard trucks for the quartermaster's department and not John G. Utz, as was erroneously stated in this publication last week. Mr. Utz will serve on the military board for the standardization of trucks.

Gasoline Economy Urged

Elimination of Excessive Driving May Save 1,153,000 Gal. of Gasoline for War

WASHINGTON, Aug. 14—Van H. Manning, director of the Bureau of Mines, sounds a cheerful note in connection with the gasoline situation in this country in a statement issued by him in which he discusses the various ways in which the gasoline supply could be conserved, and he concludes as follows:

"This general warning does not mean that automobile owners should lay up their cars and it does not mean that anyone should change his mind about purchasing a car, but it does mean that everyone must be thoughtful and judicious in the use of them. In other words, if the man with the car can be impressed with his duty in the premises, if he can realize his patriotic duty and act accordingly, then there will be no problem, for the United States is blessed with a wonderful supply of gasoline."

Economy Urged

Director Manning urges that a campaign against unnecessary and extravagant pleasure riding during the period of the war be started by the motorists themselves, and he says that if this is done enough gasoline will be saved in this way to take care of the war needs of the United States. If the automobile owners and dealers in gasoline handle "this most perfect of all fuels in a careful and economic manner," Mr. Manning says, they can save enough gasoline to perhaps take care of the war needs of the Allies.

Director Manning estimates that the army and navy will need for the next year 350,000,000 gal. of gasoline, the war making it necessary, if it is to be fought to a successful conclusion, for the army and navy to have on hand enough gasoline for the airplanes, trucks, automobiles, tractors and other machines in use.

Mr. Manning urges, in addition to the elimination of excessive pleasure riding, which he thinks should save more than 1,000,000 gal. each day in the year, that the engine be not permitted to run idle; that kerosene be used in garages instead of gasoline for cleaning; that leaky carbureters be prevented by shutting off the gas at the tank, and that judicious regulation of the gasoline relative to the amount of air be observed. If so, he thinks 1,153,000 gal. of gasoline daily could be saved.

June Exports Total \$11,453,708

\$2,599,418 Increase June, 1916
—Automobile Shipments
Feature Gain

Mos. Cars	Value	1917 Trucks	Value	Parts
June..7609	\$5,721,494	1245	\$2,965,254	\$2,766,960
May...6725	5,489,980	1764	3,216,620	2,715,696
		1916 Trucks	Value	
June..4905	3,416,396	1416	3,551,148	1,886,746

WASHINGTON, Aug. 14—Exports of automobiles, trucks and parts for June showed little increase over May, amounting to \$11,453,708, as compared with \$11,422,596 in the previous month. Comparison with June, 1916, on the other hand, showed an increase of \$2,599,418, of which \$2,305,098 was in automobiles and \$585,894 in trucks. There was a drop from \$120,000,866 to \$118,243,175 in the 11 previous months, as compared with the same period in 1916. Parts shipments in June were increased from \$1,886,746 in June, 1916, to \$2,766,960.

The United Kingdom and Canada continue to be our biggest buyers, the first country importing \$2,391,023 worth of cars and trucks and the latter \$1,673,758. Most of Great Britain's purchases, however, were in trucks. Australia increased its purchases from \$305,431 in May to \$584,654 in June. France, on the other hand, decreased its purchases from \$694,687 in May to \$480,154. A large buyer of American motor vehicles was Asia and Other Oceania, whose purchases amounted to \$894,960.

South American countries are increasing their purchases of American cars and trucks each month. June statistics show increases in Brazil, Chile, Venezuela and other countries in that part of the world. Chile nearly doubled its purchases over May, buying motor vehicles valued at \$398,976 as compared with \$158,236 in the previous month.

For the 11 months previous to June \$90,958,243 worth of motor vehicles were

purchased by foreign countries, of which the United Kingdom, France, Canada, and Asia and Other Oceania bought \$55,382,409 worth. Great Britain, alone, took over \$18,000,000 worth, while France purchased \$14,691,460 worth. Canada's purchases amounted to \$12,088,787 and those from Asia and Other Oceania amounted to \$10,093,720. Shipments to Australia amounted to \$4,213,874.

Bars Airplane Shipments to Neutrals

WASHINGTON, Aug. 13—Neutral countries have been sending in such large orders for American airplanes that in order to conserve the supply for itself and allies, the U. S. Government has been obliged to prohibit the export of aircraft except by license.

Automobile Plant for Mexico

CITY OF MEXICO, Aug. 10—Monterey, capital of Nueva Leon, Mexico, is to have an automobile factory, this location, it is said, being a favorable one for the establishment of an industry of this character.

Airplane Mail Service in Mexico

CITY OF MEXICO, Aug. 10—Mexico has established what is claimed to be the first regular mail service by airplane in the world. This service now extends from Mexico City to Vera Cruz, from Mexico City to Queretaro, and from Mexico City to Pachuca, the first being covered in 4 hrs., the second in 2 hrs. and the third in 45 min.

Ford Employees Paid Same Wages for Farm Work

DETROIT, Aug. 9—The Ford Motor Co. of Canada will pay all of its employees who are working on farms at this time the difference between what the farmers pay and the company's wages. The company has 100 of its employees engaged at present assisting with the harvesting of crops. All of these men are experienced farmers.

Australia Bars Body Imports

Complete Vehicles Prohibited by Luxury Board—Chassis Without Bodies Allowed

SYDNEY, AUSTRALIA, Aug. 13 (*Special Cable*).—The Luxury Board has at last announced its policy in regard to automobile importation. Under its decree the importation of complete motor vehicles is prohibited, although manufacturers may continue to ship chassis without bodies into Australia. All complete motor vehicles now in transit between the factories and this country can enter Australia, being excepted in the ruling, which applies only to shipments made after this date.

It is estimated that not 20 per cent of the American-built motor vehicles imported into Australia up to this time have been shipped without bodies. This means that the body-building facilities in Australia will be inadequate to cope with the problem of providing bodies for the same number of chassis as were previously imported with bodies. This indicates at least a temporary decline in shipments of motor vehicles to this country.

Australia created the Luxury Board to solve its import problem. Trade statistics show that imports into Australia have been increasing at a phenomenal rate for the past 10 months. This situation, combined with a 33 per cent increase in the cost of clothing and large increases in the price of other materials and commodities, has caused serious concern.

Sweden Forbids Mica Shipments

STOCKHOLM, Aug. 1—Export of mica unmanufactured or cultivated, also co ored, manufactures thereof, not specially mentioned, is prohibited in a new Swedish decree.

Exports of Automobiles, Trucks and Parts for June and Fiscal Year Ending June

	June				Eleven Previous Months			
	1916		1917		1916		1917	
	No.	Value	No.	Value	No.	Value	No.	Value
Passenger cars	4,905	\$3,416,396	7,609	\$5,721,494	56,231	\$40,658,833	64,834	\$48,620,928
Commercial cars	1,416	3,551,148	1,245	2,965,254	21,265	56,805,548	15,977	42,337,315
Parts, not including engines and tires....	...	1,886,746	...	2,766,960	...	22,536,485	...	27,284,932
Total	6,321	\$8,854,290	8,854	\$11,453,708	77,496	\$120,000,866	80,811	\$118,243,175
By Countries								
Denmark	40	\$28,939	6	\$10,104	847	\$585,384	1,273	\$1,014,182
France	688	1,083,151	392	480,154	7,768	19,137,904	5,631	14,691,460
Germany .....	...	...	...	...	...	...	...	...
Italy	80	39,788	26	11,600	387	231,895	276	294,457
Russia in Europe.....	44	157,900	90	154,024	5,177	15,686,874	2,513	6,371,982
United Kingdom	633	1,442,865	1,076	2,391,023	18,428	26,147,882	7,797	18,508,442
Other Europe	524	751,091	231	286,261	2,673	3,402,422	4,571	3,926,692
Canada	1,191	911,323	2,032	1,673,758	10,403	7,279,956	15,057	12,088,787
Mexico	38	27,882	1,005	649,182	434	409,700	3,025	1,833,975
West Indies and Bermuda.....	301	233,646	554	400,279	4,656	2,876,112	5,315	4,072,647
Argentina	369	187,123	212	161,568	4,444	2,097,802	4,065	2,482,256
Brazil	47	35,412	130	92,877	283	177,603	888	533,883
Chile	70	49,486	528	398,976	843	576,777	2,656	1,982,538
Venezuela	92	50,690	27	21,461	524	327,185	546	356,009
Other South America.....	84	51,783	230	183,888	631	371,426	2,279	1,448,818
British East Indies.....	237	162,124	86	83,222	3,071	2,007,739	4,778	3,617,351
Australia	335	242,462	826	584,654	7,378	5,904,137	5,600	4,213,874
Asia and Other Oceania.....	760	1,021,665	1,127	894,960	5,496	7,170,518	9,716	10,093,720
Other Countries	788	490,214	276	208,757	4,053	2,773,065	4,825	3,427,170
Total	6,321	\$6,967,544	8,854	\$8,886,748	77,496	\$97,464,381	80,811	\$90,958,243

Souther, Standards Pioneer, Dies

Former S. A. E. President Succumbs After Operation—
Blow to U. S. Aviation

WASHINGTON, Aug. 25—*Special Telegram*—Major Henry Souther died in the hospital at Fort Monroe to-day following an operation. He had been sick for only a few days and there had been no hint that his illness was serious. His death is an irreparable loss to the U. S. Aviation Department, for he held the post of Senior Officer in the Aircraft Engineering Division, had had far more experience than most of his colleagues, and possessed an exceptional organizing ability in addition to scientific attainments of a very high order. His loss will be felt by the automotive industry as a whole with equal severity.

Henry Souther has been a very prominent man in the automobile world for many years. He was the father of standardization, starting the great work in the days of the A. L. A. M. before the creation of the S. A. E. He was the first chairman of the S. A. E. standards committee and served for 3 years, from 1910 to 1913, during which time the steel standards were enormously elaborated beyond what the A. L. A. M. had done, while many of the other most important standards were created. Henry Souther in this work had far more to do than to act as a committee chairman, for he had the task of convincing a reluctant industry of the value of standards. He was the greatest salesman the standardization idea ever had. Far-sighted and clear-thinking, he could not only see the great value of standards to manufacture, but he was gifted with the ability easily to transfer his convictions to others. During his presidential year, 1910-1911, the S. A. E. made vast strides forward and he was always, up to the day of his death, prominent in any work that the society undertook.

Mr. Souther was born in 1865, educated in Boston schools and the Massachusetts Institute of Technology, where he took a course in mining and metallurgy. He was with the Pennsylvania Steel Co., Steelton, Pa., for 6 years, then with the Pope Mfg. Co. for 6 years in charge of materials and as general consulting engineer. His automobile associations started in metallurgical and other research work in the bicycle days. He later did much work in the A. L. A. M. laboratory and was a consulting engineer specializing in metallurgy for many important automobile and bicycle concerns. In 1912 he joined the Standard Roller Bearing Co. and went to England to study the manufacture of Rudge-Whitworth wire wheels, afterward starting the Standard Roller Bearing Co. on similar lines. In 1914 he became general manager of the Ferro Machine & Foundry Co., Cleveland. Here he remained until taking up his military appointment last year. The rank of Major was given Mr.



MAJOR HENRY SOUTHER

Souther just after the declaration of war by the United States. He was a life member of the S. A. E. and was also at the head of the Souther Engineering Co., Hartford, Conn.

Three Companies Drop Models

NEW YORK, Aug. 11—As a possible step toward economy, the Nash Motors Co. has dropped the manufacture of its four-cylinder model. The Lexington-Howard Co. has dropped its 6-P model, made up as a 7-passenger touring and selling at \$2,875. The Regal Motor Car Co. has dropped the Model F eight selling at \$1,200 and built as a 2-passenger roadster.

Grant Price Remains Unchanged

CLEVELAND, Aug. 14—The Grant Motor Car Corp. will not increase its prices as reported in this paper last week when it was stated that an increase of \$75 would occur. The old price of \$875 is still maintained.

Union City Truck \$90 Higher

UNION CITY, MICH., Aug. 10—The Union City Motor Truck Co. has increased the price of its product from \$1,985 to \$2,075, which includes the chassis with cab, top and seat.

Wolverine Motors Starts Work

KALAMAZOO, MICH., Aug. 9—The Wolverine Motors, Inc., has started work on the construction of the Wolverine Speedway Special, a sport roadster. The company's plant is not yet completed and the first model is being made at a local garage. It will be ready for road tests within the next 3 weeks. The frame is of 7-in. suspension type. Front and rear axles are made by the American Ball Bearing Co., of Cleveland, engine by Wisconsin Motors, transmission by the Warner Co. and springs by the Kalamazoo Spring & Axle Co. The car will be equipped with Hartford shock absorbers and will carry 33 by 5 cord tires.

General Increase in Prices

Gradual Readjustment Going On in Automobile Industry
—More Changes Coming

NEW YORK, Aug. 11—Price readjustments are taking place in the automobile industry each day to take care of the rise in material prices and wages. Though announcements have been made through these columns of prices each week, a number of companies have made no mention of these changes and have only notified their dealers.

The following list will give the changes that have not appeared to date:

Car and Model	Old Price	New Price
Apperson 6-17, Two-Pas...	\$1,850	\$1,990
Apperson 6-17, Five-Pas...	1,790	1,930
Apperson 6-17, Seven-Pas...	1,850	1,990
Apperson 8-17, Two-Pas...	2,000	2,250
Apperson 8-17, Seven-Pas...	2,000	2,250
Bour-Davis 17, Five-Pas...	1,250	1,385
Daniels, Two-Pas...	2,800	3,100
Daniels, Five-Pas...	2,800	3,100
Daniels, Seven-Pas...	2,800	3,100
Franklin, Two-Pas...	1,900	2,000
Franklin, Five-Pas...	1,950	2,050
Franklin, Coupe...	2,750	2,850
Franklin, Sedan...	2,850	2,950
Franklin, Limousine...	3,100	3,200
Glide, Five-Pas...	1,295	1,395
Grant, Two-Pas...	875	950
Grant, Five-Pas...	875	950
Grant, Coupe...	1,010	1,085
Grant, Sedan...	1,050	1,125
Hollier 186-6, Five-Pas...	985	1,085
Hollier 178-8, Two-Pas...	1,185	1,285
Hollier 178-8, Five-Pas...	1,185	1,285
Paterson, Two-Pas...	1,195	1,295
Paterson, Five-Pas...	1,195	1,295
Paterson, Seven-Pas...	1,195	1,295
Pilot, Two-Pas...	1,200	1,295
Pilot, Five-Pas...	1,200	1,295
Stearns SKL4, Two-Pas...	1,495	1,585
Stearns SKL4, Five-Pas...	1,495	1,725
Stearns SKL4, Coupe...	2,050	2,150
Stearns SKL4, Limousine...	2,900	3,000
Stearns SK8, Two-Pas...	2,250	2,375
Stearns SK8, Seven-Pas...	2,250	2,375
Stearns SK8, Coupe...	2,900	3,075
Stearns SK8, Limousine...	3,500	3,785
Studebaker:		
SF-4-40, Two-Pas...	985	1,050
SF-4-40, Seven-Pas...	985	1,050
SF-4-40, Det. Top...	1,185	1,250
ED-6-50, Two-Pas...	1,250	1,335
ED-6-50, Seven-Pas...	1,250	1,385
ED-6-50, Coupe...	1,750	1,850
ED-6-50, Sedan...	1,700	1,850
ED-6-50, Limousine...	2,600	2,750
ED-6-50, Det. Top...	1,450	1,565

Standard Trucks Fitted with Four-Speed Gears

DETROIT, Aug. 13—The only changes made in the mechanical construction of the two models of Standard motor truck, made by the Standard Motor Truck Co., Detroit, Mich., are in the cooling system and the transmission. These models are known as Models 65 and 85 and have capacities of 3½ and 5 tons respectively.

The change in the cooling system consists in the adoption of a radiator of the vertical tube type with a new design of cast tanks. The radiator is made in sections, with a core which is easily removable. The top tank can be taken off and any defective tubes taken out. The transmissions now afford four speeds and are of Brown-Lipe manufacture.

The new chassis prices are \$4,000 for the 5-ton, \$3,200 for the 3½-ton and \$2,500 for the 3-ton model. This is a \$200 increase on the 2 and 3½-ton sizes and a \$300 increase on the 5-ton sizes.

Industrial Review of the Week

A Summary of Major Developments in Other Fields

NEW YORK, Aug. 15.—The American industries are at present facing many problems through a shortage of labor and Government work. Action on the part of the U. S. Government in regard to the supply of materials for war purposes is holding up work in several of the industrial fields. Though there is a slackening in some of the trades, it is only momentary, due to a quiet preparation for a large Fall trade. The other industries, on the other hand, are in the midst of a tremendous drive to carry out war and domestic contracts and as a result the materials and allied fields have quickened their activities. Prices are steadily being brought to lower levels and supplies are coming through at a normal rate.

764 Baldwin Locomotives for France

The big feature of the activities in the railway world last week was the order placed by the U. S. Government for 764 Baldwin locomotives for use in France to aid the army. Three hundred and eighty of these are of the 80-ton narrow gage type, some of them being gasoline operated. An order of just as great importance is that for 6000 30-ton freight cars to be used for the army in France.

The American railroads are gradually solving the big problems in the shipping field and are alleviating unfavorable conditions. The big materials and food producers are being benefited by the latest step on the part of the railroads to send 20,790 freight cars to the Middle West and South West to relieve the farmers and lumber producers.—*Railway Age Gazette*.

Steel Exports Large

Government orders for steel are increasing and the export movement is large in spite of embargoes; but ordinary domestic business in iron and steel is insignificant. Pressed by some of its Allies to get for them much-needed steel, the Government is hurrying its cost-finding inquiry, but as telegrams for iron ore costs only went out this week the investigators are some distance from the end.

Without taking a final position on the question of selling to the Allies at the same prices as to the Government, steel manufacturers have accepted orders from officials at Washington this week applying on 10,000 tons of annealed wire and 20,000 tons of wire rods for Italy, prices to be fixed after the Trade Commission's findings are made up. When these Italian inquiries first appeared some weeks ago, 4.50c. was quoted on the wire and \$85 on the rods.

While the general question is in abeyance, it is understood that some steel interests have expressed a willingness

A New Service

Herewith THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES supplies for the benefit of its readers a general summary of important developments in other fields of business. This is rendered possible by the editorial co-operation of leading industrial publications which are recognized authorities.

By compressing the general industrial situation into this form we hope to give our readers a clear and comprehensive idea of up-to-the-minute developments which they could otherwise secure only with considerable expenditure of time and effort.

to take business from the Government at prices to be determined later, even though the material is for an ally.

For the American army in France a 20,000-ton inquiry for 25-lb. rails has come out, for use in portable tracks. Unlike the recent contracts for 150,000 tons of 80-lb. sections no price is fixed, but bids are asked. Contrary to reports, none of the 80-lb. rails were refused by the mills, but on two of the lots concerning which a question was raised as to price, orders to go ahead with the rolling have not yet been given, though all these rails are wanted in six weeks.—*Iron Age*.

\$500,000,000 More for Ships

Congress, it is expected, will ask for an appropriation of \$500,000,000 for the construction of ships. The United States Shipping Board Fleet Corp. has been given contracts for building the Government's steel and wooden vessels, ranging from 7000 to 8000 tons. Private contracts are few, most attention being paid to war work. The navy is desirous of building more destroyers, work on which is now being concentrated.—*Marine Engineer*.

Government Accepts Wool Offer

The offer of the Boston wool trade to sell wool to the Government at the price of the close of July has been accepted by the authorities at Washington. Similar offers following the Boston action have been made and accepted upon the part of the Chicago and Philadelphia trade. About 2,500,000 lb. of knitting yarn has been purchased by the Red Cross within the past few days.—*Textile World Journal*.

Lower Rubber Prices Probable

The crude rubber situation is steady and quiet. Prices are steady. Though there is plenty of crude held by the producer there is little demand from the manufacturers who are holding out for lower prices. Manufacturers are all busy taking care of Government orders,

which include gas masks, foot wear, etc. The tire industry has not felt the effect of the war stimulation, though it is getting ready to take care of this additional work. Labor is still scarce and as a result there is a reduced schedule in some quarters. Many of the mills, however, are busy now, when they have formerly been quiet. This applies especially to the mechanical rubber makers who are doing a large business in hose on account of large orders from the dealers who are anticipating increased prices.

The cotton situation is serious. Sea Island and Egyptian cotton, which is used extensively by the tire makers, is very scarce, and as a result the makers are turning to the American long staple cotton, or peeler. Normally Sea Island cotton shipments amount to about 71,000 bales. Hardly any is coming over. Egyptian cotton shipments amount to about 200,000 bales. About 15,000 bales have reached this country. Great Britain, some time ago, declared an embargo on shipments of Egyptian cotton to this country. Today's reports show that Great Britain has bought the 1917 supply of cotton seed in Egypt. It is expected, however, that satisfactory results can be had from American cotton and that the same tire mileage guarantees can be maintained. The use of cord, it is also believed, will solve the situation. Tire fabrics are hard to get on account of the demand from the Government for duck and other fabrics for use in balloons, airplanes, etc.—*India Rubber World*.

Electrical Business Quiet

Heavy buying is expected in the electrical field this fall and as a result stocks throughout the entire country are being replenished. Market conditions remain quiet during the past week. The excessive heat has put a damper on trading at present and business is consequently languid. The uncertainty of the price-fixing program in Washington has also resulted in a let-up in business.—*Electrical World*.

Fall Building Large

Promise of much activity in the industrial building field is promised by the large contracts which are now on hand in the architects' offices. Building conditions are now more favorable, as there is a downward movement in material prices. Thriving business conditions have resulted in a stimulated building trade.—*F. W. Dodge Construction Reports*.

More Lumber Needed

Trade is brisk in the lumber field through a large demand from the jobbers and the Government, but the demand cannot be filled on account of a big need

of stock. The railroads have placed an embargo on lumber shipments and consequently have placed this trade in a none too favorable position as regards filling orders. The lumber trade is at present up in arms in regard to the Government's decision on preferential shipments. Lumber has been left out of the list.—*N. Y. Lumber Trade Journal*.

Labor Shortage in Engineering Field

Labor shortage continues to be the chief problem in the engineering field, though conditions are expected to be improved in a few weeks as a result of the Government investigation. The United States has appropriated \$100,000 to investigate employment methods throughout the country. The recent strike in the shipyards has been the cause of much worry to the Government. There is a steel shortage for shipbuilding. Non-delivery on contracts in the engineering field is also a big problem which is being investigated. Much blame has been put on the machinery and structural industry for taking larger orders than can be filled.—*Engineering Magazine*.

Class B Army Truck Chassis on Road Soon

WASHINGTON, Aug. 15—*Special Telegram*—The standard design for the class B military motor truck is well advanced, so much so that it is hoped to pass finally upon it next week and then to proceed at once with the making of the experimental chassis.

The record so far is briefly as follows: 1—Two layouts made for the engine, showing alternative constructions which will be decided upon within 2 days and may be amalgamated into the single final design. These two layouts have been made to enable certain fundamental difference to be compared properly; 2—Transmission is finished; 3—Front axle is complete; 4—The three axle designs, worm, internal gear and double reduction, are nearly completed and will be approved this week; 5—Springs are finished; 6—Radiator tests are in progress to settle the best type.

There has been one change of some importance, this being that the clutch is to be made up as a unit with the transmission, instead of with the engine. It will be inclosed in an extension of the transmission case and the control for clutch and gear shifting will also be mounted thereon. This has been done partly to allow the steering gear to be placed farther forward, which is permitted by the absence of the bell housing. The flywheel will be open and it is thought that general accessibility will be improved. Everything points to the probability that the first chassis will be on the road in accordance with anticipations, that is, in a few weeks.

Fractors Pass N. J. Headlight Tests

NEWARK, N. J., Aug. 10—The New Jersey Automobile Commissioner has issued a certificate of approval to the Crew-Levick Co. for its headlight regulating device named Fractors.

To Open Rich Oil Lands

100,000 Acres Assured by Favorable Senate Action on Federal Leasing System

WASHINGTON, Aug. 10—Opening up of over 100,000 acres of rich oil lands throughout the country is assured by an agreement just reached between the opposing groups of Senators who, by their differences, have held up oil legislation for years. The development of these big oil fields, known to be very rich, and which were withdrawn from entry and development by President Taft, will add, it is estimated, not less than 15 per cent to the country's oil production and will probably prevent a possible prohibition of use of passenger cars and trucks.

Pennsylvania Crude Reaches Record Price of \$3.25 Per Bbl.

PITTSBURGH, PA., Aug. 13—The price of Pennsylvania crude oil reached the highest point to-day in more than 20 years. South Penn made an abrupt change upward of 15 cents a barrel, which brings the present cost of crude in that territory to \$3.25 per bbl. Several other grades also advanced from 5 to 15 cents per bbl. Officials of oil companies predict this will mean the probable rise of 1 cent per gal. in the tank wagon cost of gasoline and 4 or 5 cents per gal. in the cost of lubricating oil.

Another Big Petroleum Field Discovered

WASHINGTON, Aug. 14—The recent discovery of extensive petroleum supply on the Island of Angel de la Guarda, in the Gulf of California, on the opposite side from Tiburon Island, is announced by the Government of Mexico.

Big Increase of Oil in Texas

AUSTIN, TEX., Aug. 10—As a result of an enormous increase of crude oil production in Texas, the threatened shortage of the gasoline supply may not occur. Refineries are preparing to avail themselves of the increased yield of oil and besides the existing plants which will not be operated to their full capacity, plans are on foot for the erection of two or three new refineries.

What is said to be the biggest oil producing well that has been brought in in the Gulf coast fields of Texas since the exciting days that attended the first strikes on Spindletop in the early history of this industry in Texas, is flowing at the rate of about 40,000 barrels per day at Goose Creek.

\$100,000 for Mail Trucks

WASHINGTON, D. C., Aug. 11—The Senate this afternoon passed the Hardwick bill, appropriating \$100,000 to the Post Office department for the purchase of a large fleet of motor trucks to be used in experimental delivery work in large cities and their environs with a

view to reducing the cost of foodstuff delivery.

This bill is in reality one of those designed to reduce the cost of living and the fact that such a large sum has been appropriated to make use of motor trucks will undoubtedly have a large bearing on the use of similar vehicles by private individuals.

War Convention Aug. 17-21

WASHINGTON, Aug. 11—The Chamber of Commerce of the United States will hold a "patriotic war convention" at Atlantic City, Aug. 17 to 21, inclusive, for the announced purpose of developing "plans for still greater service in carrying the war to a quick and successful conclusion." This conference is predicated upon the view, according to R. Goodwyn Rhett, president of the National Chamber of Commerce, that the "nation's business to-day is war."

A principal topic of discussion will be the duty that business owes the government in war. Also, of particular interest will be the discussion of the readjustment after the war for which business must prepare.

One Motorcycle Show

(Continued from page 298)

ing. Action was taken by the association on the resolution formulated at the meeting of the Military Motorcycle Standardization Committee, urging centralized control over motorcycle companies of the army and the establishment of schools for military motorcycle riders. It was decided to appoint a committee to present this resolution to the proper Government representatives at Washington in person.

Information had reached the association that Representative Julius Kahn of California would be glad to accept an invitation to speak before the meeting. The invitation was extended and Mr. Kahn delivered an intensely interesting talk on the war situation and on his definition of patriotism, in which he stated that all business men, whether members of an association or individuals, could not take any halfway course in this emergency. The Motorcycle and Allied Trades Association, bearing this in mind, immediately instructed Secretary Perkins to send to President Wilson the following telegram expressing their sentiments:

"Hon. President Wilson, White House, Washington, D. C.

"The following resolution was adopted unanimously at the meeting of the Motorcycle & Allied Trades Association held at Atlantic City August ninth, including all motorcycle manufacturers and makers of the constituent parts of motorcycles in the United States, assembled at their annual convention: 'Recognizing the heavy task and grave responsibility of the United States Government in carrying on the war against autocracy, and that the United States Government is entitled to the most active support and co-operation of every citizen and civic business organization of this country for the efficient and vigorous prosecution of the war to a triumphant conclusion, therefore be it resolved that the Motorcycle & Allied Trades Association hereby pledges such service and complete co-operation on the part of the organization and its individual members to the President and the Government of the United States.—Donald G. Perkins, Sec. and Mgr.'"

Standard Parts Earns 28%

Merger of American Ball Bearing Co. May Be Based on Exchange of Stock

CLEVELAND, Aug. 13—Standard Parts Co. net earnings for the first 6 months of the company's existence, the period ended June 30, 1917, were better than 28 per cent on the common stock after liberal depreciation, but before deduction for excess profits tax. The company is selling over 90 per cent of its output to manufacturers of trucks and passenger cars retailing at less than \$1,000, and since this branch of the automobile industry has enjoyed exceptional prosperity there has been no decrease in the company's volume of business.

The company, as stated in a recent issue of THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES, has an opportunity to acquire the plant of the American Ball Bearing Co., which has equipment especially adapted for the manufacture of heavy axles, demand for which has been created by the war. The opportunity to acquire the plant is based on an exchange on the basis of asset values of American Ball Bearing common stock for Standard Parts common stock. Directors of the Standard Parts Co. have recommended the purchase.

Christian Girl, president of the Standard Parts Co., states that the Standard Parts Co. has business available which will fully occupy the Ball Bearing plant and its acquisition will bring into the assets of the Standard Parts Co. about \$500,000 new working capital and some valuable contracts.

Smith Motor Truck Obtains Loan

NEW YORK, Aug. 11—J. W. Seligman & Co. will advance the Smith Motor Truck Corp. \$750,000 during the next 6 months. This money will be applied to working capital in conducting the company's business. During the 6 months ended June 30 last, the company's net amounted to \$934,000, and after meeting the preferred stock dividends the net profits were \$787,000.

Maxwell Passes Common and Second Preferred Dividends

NEW YORK, Aug. 15—The directors of the Maxwell Motor Co. at their meeting yesterday passed the quarterly dividend of 1½ per cent on the second preferred and the quarterly of 2½ per cent on the common stock. The regular quarterly dividend of 1¼ per cent was declared on the first preferred stock, payable Oct. 1 to stock of record Sept. 10. The passing of the dividend was expected in financial circles as it was believed that the company would take some action in regard to the conservation of its cash assets in order to provide a larger working inventory of raw materials and because of the present uncertainty of the excess profits tax, which has not yet been determined.

The directors in an official statement said that the profits of the company for the fiscal year ended July 31 are practically the same as those of the previous year without any reduction on account of the proposed excess profits tax now under consideration by Congress. The profits in the 1916 fiscal year were \$5,426,635.

The company has no outstanding loans or indebtedness of any kind, except current accounts payable. The cash and sight drafts on hand July 31 amounted to \$3,700,000.

Preliminary estimates of Maxwell Motor earnings for the fiscal year ended July 30, 1917, show net profits in excess of \$5,000,000, equivalent to \$30 a share on the common stock after deduction of the dividends for the 7 per cent cumulative first preferred and the 6 per cent non-cumulative second preferred. This record of earnings is equal to the showing made in the fiscal year 1916, when 30 per cent was earned for the common as compared with 6½ per cent in 1916.

Maxwell Plans Use of Chalmers Plant for Trucks

DETROIT, Aug. 16—The Maxwell Motor Co. is negotiating a lease of the plant of the Chalmers Motor Co. The closing of the deal hinges on the obtaining of a contract for motor trucks from the Government.

The arrangement, if carried out, will not interfere with the production of Chalmers automobiles.

Parts Companies Merge

BENTON HARBOR, MICH., Aug. 13—The Morrill & Morley Mfg. Co. and the Electric Specialties Mfg. Co. have merged their resources and will operate under the name of the Benton Harbor Auto Machine Co. The company has authorized capital stock of \$174,000 of which \$87,000 is paid in. The two concerns were engaged in making automobile parts. Officers of the new company are: President, J. N. Klock; vice-president, L. N. Allen, Detroit; secretary, H. S. Gray; treasurer and manager, R. C. Eisley.

Hassler Motor Co. Dissolves

INDIANAPOLIS, Aug. 13—The Hassler Motor Co. has filed preliminary certificate of dissolution with the secretary of state and within a few weeks will be dissolved as a corporation. The company was organized early in the year with ample financial backing, and was prepared to place on the market a medium-priced car of attractive design. Robert H. Hassler of the Hassler Shock Absorber Co. was the head of the motor company. Several cars were manufactured and were shown at shows in Chicago and other cities, but officers of the company decided that the time is not opportune at the present to place a new car on the market and it was decided to drop the venture. The company had made no extensive investments in equipment.

Fisk Earnings \$15,714,971

Half-Year Net Only \$1,000,000 Less Than for Entire 1916 Year

NEW YORK, Aug. 11—The Fisk Rubber Co. for the 6 months to June 30 last showed a large gain in gross and net profits. The total sales for the period of \$15,714,971 were only \$4,000,000 less than for the entire 1916 year, when they totaled \$19,457,788.

Net income, after depreciation and interest, was actually larger for the ½ year than for the entire 12 months of 1916. The actual net for the 6 months was \$1,983,627, as compared with \$1,836,829 in 1916.

As of June 30 Fisk had outstanding three classes of preferred stock aggregating \$13,525,000 in amount. After allowing for all the preferred dividends for the period, totaling \$473,370, the balance, or \$1,510,257, is equal to \$19 a share on the \$8,000,000 common, or at the annual rate of \$38 a share. On the same basis of capitalization Fisk earned in all of last year only a little more than \$11 a share on the common.

On June 30 last Fisk had net quick assets of \$10,726,267.

\$6,605,776 Business for Miller Rubber in 7 Months

AKRON, Aug. 10—The Miller Rubber Co.'s business has not been affected adversely by war conditions. The total volume of business done by this company in the first 7 months of 1917 shows an increase of approximately 85 per cent over the corresponding period of last year. In 1916 the volume between Jan. 1 and Aug. 1 amounted to \$3,599,000. In the corresponding period of this year, the total volume amounts to \$6,605,000.

The comparative sales for each month are interesting.

	1916	1917
January	\$416,780	\$706,160
February	347,786	774,646
March	503,755	856,257
April	466,145	1,082,869
May	555,597	1,055,216
June	658,768	1,091,162
July	650,205	1,039,463
	\$3,599,037	\$6,605,776

U. S. Light Shows Profit

NIAGARA FALLS, Aug. 11—A net profit of \$4,884.30 for the year is reported by the U. S. Light & Heat Corp. at its annual meeting. Losses for the year ending June 30, 1916, amounted to \$331,792.42 and the losses continued through the first 8 months of the year just past. But the profits of the last 4 months absorbed all the losses of the earlier months, and finally left a net profit of \$4,884.30. This is a net improvement of \$336,676.72 over the previous year.

The abnormal manufacturing conditions, the rapid increase in cost of both labor and materials, and unusual traffic

conditions of the past winter were successfully met due to the organization being permitted to devote its entire time to its manufacturing problems. The volume of business showed an increase of 72 per cent.

The old officers have been retained with E. H. Gold, chairman of the board, J. Allan Smith as president, C. L. Lane and H. C. Caples, vice-presidents and B. J. O'Reilly, treasurer.

Gurney Bearings for Ford Tractor

DETROIT, Aug. 11—Henry Ford & Son will equip their new farm tractor with Gurney ball bearings.

Large scale production of the tractor has been started and several carloads of the bearings have already been completed by the Gurney Ball Bearing Co., Jamestown, N. Y. Sixteen Gurney ball bearings will be used on each tractor, located as follows: Two in each front wheel, six in the transmission, two in the worm drive, two in the differential, two on the fan shaft, and two on the pulley shaft when pulley is furnished.

CAPITAL CHANGES

Electric Auto-Lite Corp. of New York has increased capital from \$13,000,000 to \$15,000,000.

Standard Steel Castings Co., Cleveland, from \$125,000 to \$1,000,000.

DIVIDENDS

White Motor Co., \$1 a share, payable Sept. 29 to holders of record Sept. 15.

Ajax Rubber Co., quarterly of \$1.50 per share, payable Sept. 15 to holders of record Aug. 31.

Airplane Stocks Are Strong

General Motors Active as Result of Attack on Short Term Holders

NEW YORK, Aug. 14—Strength in the airplane issues was the feature of the automotive market last week. Both Curtiss and Wright-Martin were dealt in in heavy volume. Reports were current that price negotiations with the Government were progressing satisfactorily. Interest extended also to Submarine Boat and General Motors.

The latter stock was strong. A large number of the brokers in the stock loan market were endeavoring yesterday to borrow this stock as a result of a calling in of loans of that issue. The stock was borrowed at 1½ per cent premium shortly after the close, but later was 1½ per cent premium bid without a supply appearing. The word was passed around brokerage offices yesterday that the shorts in this stock would be chased to cover before the closing gong on the Stock Exchange rang. But there is still a heavy short interest in the stock and as a result there is much more action expected to-day on the part of the brokers to, oust the shorts.

Willys-Overland in Absolute Control of Curtiss

TOLEDO, Aug. 14—The Willys-Overland Co., through purchase of securities, is now in absolute control of the Curtiss Aeroplane & Motor Corp. directorate and

the property for 3½ years. Details of the financial arrangements of the deal show a sale of the Overland 7 per cent preferred stock to private interests for \$3,475,000. It receives full par value and in turn the purchaser agrees not to offer the stock for sale inside 1 year from Aug. 1, 1917.

Willys-Overland gave Curtiss interests \$1,600,000 6 per cent notes maturing on or before Aug. 1, 1918, with agreement such notes are not to be sold.

For the preferred and notes Willys-Overland receives 24,000 shares of Curtiss Aeroplane 7 per cent preferred at \$75 per share; 60,000 shares of common at \$25 a share; \$1,600,000 Curtiss 10-year 6 per cent notes, convertible into common at \$50 at any time before maturity. The company has already disposed for cash 20 per cent of the notes and preferred and common stocks to interests closely associated with Curtiss.

Ford Building 200,000 Airplane Cylinders

DETROIT, Aug. 16—The Ford Motor Co. is making 200,000 airplane cylinders of steel for the Government to be delivered at the rate of 1000 a day.

Oldfield Establishes Dirt Track Records

ST. LOUIS, Mo., Aug. 11—Barney Oldfield broke two world's dirt track records here to-day when he drove 15 miles in 12:04, bettering the previous record of 12:23, made by Bob Burman at Bakersfield, Cal., in 1915, and setting a new mark of 7:58.8 for 10 miles. The best previous mark over a 1 mile dirt track for 10 miles was also held by Burman, his time being 8:15.8.

Automotive Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Ch'ge
*Ajax Rubber Co.	66	68	..
*J. I. Case T. M. Co. pfd.	82½	84	+4½
Chalmers Motor Co. com.	5	10	..
Chalmers Motor Co. pfd. ....	..	..	..
*Chandler Motor Car Co.	79	79½	—4
Chevrolet Motor Co.	90	92	—2
Curtiss Aeroplane	52¼	49½	—¼
Fisher Body Corp. com.	37½	38	—2½
Fisher Body Corp. pfd.	88½	90	..
Fisk Rubber Co. com.	65	70	—9
Fisk Rubber Co. 1st pfd.	104	106	..
Fisk Rubber Co. 2nd pfd.	92	95	..
Firestone Tire & Rubber Co. com.	114½	118¾	+½
Firestone Tire & Rubber Co. pfd.	102½	104½	+½
*General Motors Co. com.	111½	111½	—3½
*General Motors Co. pfd.	85½	87	—2¾
*B. F. Goodrich Co. com.	49	50¼	..
*B. F. Goodrich Co. pfd.	105	106	..
Goodyear Tire & Rubber Co. com.	193	196	—2
Goodyear Tire & Rubber Co. pfd.	105¼	106¼	+¼
Grant Motor Car Corp.	3	6	..
Hupp Motor Car Corp. com.	2¼	3¼	..
Hupp Motor Car Corp. pfd.	72	80	..
International Motor Co. com.	6	15	+1
International Motor Co. 1st pfd.	20	40	—10
International Motor Co. 2nd pfd.	10	20	..
*Kelly-Springfield Tire Co. com.	45	46	—¼
*Kelly-Springfield Tire Co. 1st pfd.	87	95	..
*Lee Rubber & Tire Corp.	21¾	21¾	+½
*Maxwell Motor Co., Inc. com.	31½	32¾	—3¼
*Maxwell Motor Co., Inc. 1st pfd.	65¾	67	+1¾
*Maxwell Motor Co., Inc. 2nd pfd.	24	25	—¼
Miller Rubber Co. com.	165	175	..
Miller Rubber Co. pfd.	102	104	..
Packard Motor Car Co. com.	126	132	..
Packard Motor Car Co. pfd.	94	99	..
Paige-Detroit Motor Car Co.	25	26½	..
Peerless Truck & Motor Corp.	14	17	+1
Portage Rubber Co. com.	145	150	..
Portage Rubber Co. pfd. ....	..	..	..
Regal Motor Car Co. pfd. ....	..	22	..
Reo Motor Car Co.	25	26	..
*Saxon Motor Car Corp.	17½	18½	—1
Springfield Body Corp. com.	5	15	..
Springfield Body Corp., pfd.	20	40	..

	Bid	Asked	Net Ch'ge
Standard Motor Construction Co.	11	12	..
*Stewart-Warner Speed. Corp.	60	61	—1
*Studebaker Corp. com.	53¼	54¼	+½
*Studebaker Corp. pfd. ....	..	96	..
Submarine Boat	28½	28	—¼
Swinehart Tire & Rubber Co.	23¾	24	+½
United Motors Corp.	4½	4	+2½
U. S. Aero Corp.	66	66¼	+4¾
*U. S. Rubber Co. com.	107	109	+½
*U. S. Rubber Co. pfd.	45½	46	+1
*White Motor Co.	32¾	32¾	—¾
*Willys-Overland Co. com.	95¼	95¾	—¾
*Willys-Overland Co. pfd.	13¼	12	+½
Wright-Martin Air Craft. ....	..	..	..

*At close August 13, 1917. Listed New York Stock Exchange.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	Bid	Asked	Net Ch'ge
Auto Body Co. ....	..	22	..
Bower Roller Bearing Co. ....	..	35	..
Chevrolet Motor Co. ....	..	..	..
Commerce Motor Car Co.	8	10	..
Continental Motor Co. com.	6¼	6½	..
Continental Motor Co. pfd (new). ....	..	..	..
Edmunds & Jones com. ....	..	..	..
Ford Motor Co. of Canada.	222	230	..
Hall Lamp Co. ....	..	..	..
Hayes Mfg. Co. ....	..	..	..
Michigan Stamping Co. com.	13	15	+1¼
Motor Products ....	..	..	..
Packard Motor Car Co. com.	127	131	..
Packard Motor Car Co. pfd. ....	..	99	..
Paige-Detroit Motor Car Co. ....	..	24½	..
Prudden Wheel Co. ....	..	23	..
Reo Motor Car Co.	25½	26¼	+¾

INACTIVE STOCKS

Atlas Drop Forge. ....	..	39	..
Kelsey Wheel Co.	82	..	..
Regal Motor Car Co. ....	..	26¼	..

Personals

R. E. Olds, president of the Reo Motor Car Co., has offered his Oldsmar property in Florida to the Government for 3 years without charge for an aviation camp.

William B. Stout has given up his duties as manager of the aircraft division of the Packard Motor Car Co., Detroit, to go into aircraft work for the Government in Washington.

H. H. Timken, head of the Timken-Detroit Axle Co., Canton, Ohio, has been made general chairman of the Canton War Council composed of representatives of the Red Cross Society and other organizations.

F. E. Wodell, Australasian Manager for the General Motors Export Co., is now in the United States for a brief business and social visit. He expects to leave New York in a few days, returning to Sydney via San Francisco.

A. P. Warner, Beloit, Wis., manufacturer of automobile accessories, has just been elected a director of the Bailey Non-Stall Differential Corp., Chicago.

H. A. Conlon, temporary sales manager of the Federal Motor Truck Co., Detroit, and **E. A. Haskins**, service manager, who resigned these positions, have joined the Detroit Truck Co., where Mr. Conlon has assumed the position of general sales manager.

Frank R. Jackson, who has been connected with the Zenith Carburetor Co. of Detroit since its organization, has been promoted to retail sales manager. Mr. Jackson has just returned from an extensive sales promotion trip to the Pacific Coast.

C. A. Carey, formerly purchasing agent, and **C. R. Ambrost**, formerly assistant engineer of the Chandler Motor Car Co., Cleveland, have joined **H. J. Walker & Co.**, where Mr. Carey has become director of sales and Mr. Ambrost chief engineer.

H. A. McCarthy has resigned his position as district sales manager of the Scripps-Booth Corp., Detroit.

J. C. Trumbull has been promoted to the position of assistant manager of the New York branch of the General Motors Truck Co.

Joseph J. Martin has concluded his 2-year contract with the Stewart Motor Corp., Buffalo, N. Y., as sales representative west of Buffalo.

A. F. Knobloch, vice-president and general manager of the Cole Motor Car

Co., Indianapolis, Ind., has resigned his position. Mr. Knobloch was one of the founders of the Northway Motor & Mfg. Co. and has been connected with the industry for many years.

Earl W. McGookin, formerly vice-president and sales manager of the Springfield Body Corp., has entered business in Detroit as the representative of the Macbeth Evans Glass Co., The Johnston Mfg. Co. and the Hayes Mfg. Co.

M. B. Herbert has been appointed special sales representative of the Detroit Truck Co., Detroit. Mr. Herbert was formerly connected in a like position with the Smith Motor Truck Corp.

R. A. Sweet has been appointed sales manager of the tractor division of the General Motors Truck Co., Pontiac, Mich. Mr. Sweet was formerly with the Liberty Motor Car Co.

Aluminum Castings Co., Detroit, is building an addition which will be twice the size of the present building and expects to begin operations in the new plant about Sept. 1.

J. R. Phillips, who was in charge of service and advertising for the Sheldon Axle & Spring Co., Wilkes-Barre, Pa., for the past 2 years, has accepted the position of assistant sales manager with this company.

S. S. Bradley, of Brooklyn, has been appointed general manager of the Manufacturers Aircraft Assn., New York.

George Hotz, a member of the Hotz Brothers Foundry Co., Fremont, Ohio, has been called to Washington and will be appointed a member of the committee on standardization of motor trucks.

E. M. Green has been appointed zone supervisor for the Maxwell Motor Sales Corp. of Detroit. Mr. Green was formerly the Boston supervisor for the Maxwell company.

J. P. Cahoon has joined Robert Graves, Jr., distributor of Gryphon tires in New York for the Eastern district. Mr. Cahoon has been in the tire industry for 11 years.

A. B. Hanson has been appointed factory efficiency supervisor of the United States Motor Truck Co., Cincinnati, Ohio.

John H. Diehl has been appointed general sales manager of the Mason Tire & Rubber Co., Kent, Ohio. He entered the tire field in 1894 with the B. F. Goodrich Co. and joined the Portage Rubber

Co. at the time of its organization in 1912, as sales manager, and has been with that organization in the position of manager of sales for the last 5 years.

J. M. Eaton has resigned his position as head of the welfare department of the Cadillac Motor Car Co., Detroit, and has become associated with Henry M. Leland, formerly with the Cadillac company, in his airplane development work for the United States Government.

A. E. Drake has become manager of the insurance department of the Commonwealth Finance Corp., New York. **T. A. Dobson** has become manager of the credit department and **H. S. Kerr** has become assistant treasurer. **L. M. Seiver** will represent the corporation in the Philadelphia territory while **W. H. Billings** will be in the Boston territory.

W. J. Little, Calgary, Alberta, will assume his new duties as superintendent of the St. John, N. B., Ford assembly plant about Sept. 1. The cars for the Maritime Provinces, India and Africa will be assembled under his direction.

H. J. Woodward has been appointed general sales manager of the Republic Rubber Co., Youngstown, Ohio. Mr. Woodward was formerly with the Diamond Tire Co.

Carl L. O'Donnell has been appointed district manager by the Olympian Motors Co., Detroit, for Ohio, Indiana and Michigan.

H. C. Smith has been appointed manager of the Kansas City branch of the Mason Tire & Rubber Co. Mr. Smith succeeds **G. C. VanVeen**, who has been transferred to Chicago, to open a new branch in that city.

Harrie R. Williams has been made general manager of **A. J. Picard & Co.**, New York. Mr. Williams formerly was in charge of the accessory business of the Gibson Co., Indianapolis.

J. F. Bowman has resigned as sales manager of the Federal Motor Truck Co., Detroit. Mr. Bowman was with the Federal company for 5 years.

R. H. Chapin has been appointed assistant general manager and director of sales for the Porter Mfg. Co., Ann Arbor, Mich. Mr. Chapin recently resigned as sales manager of the Weldon Co.

C. G. Lewis has been appointed Pacific coast representative for the Hudson Mo-

tor Car Co., Detroit, succeeding R. L. Barrett who resigned to join the H. O. Harrison Co., Hudson distributors in San Francisco. Mr. Lewis was formerly foreman of the mechanical department at the Hudson plant.

ELECTIONS

NEW YORK, Aug. 13—Several new directors are to be elected to the Curtiss Aeroplane & Motor Corp. board at the next meeting. It is stated that on the invitation of John N. Willys, Rodman Wanamaker of Philadelphia and G. C. Taylor, president of the American Express Co., will be elected.

Both Mr. Wanamaker and Mr. Taylor have in the past been interested in aviation from the scientific side. Mr. Wanamaker was sponsor for a project to make an airplane voyage across the Atlantic, and the Curtiss plant at Hammondsport, N. Y., had constructed, at his order, a large flying boat for this purpose when the war compelled a postponement of the project.

GREEN BAY, WIS., Aug. 11—The Lawson Aircraft Corp., recently incorporated with \$200,000 capital, has elected the following officers: President, George W. Ellis; vice-president and general manager, Alfred W. Lawson; secretary, C. I. Smith; treasurer, George A. Richardson;

counsel, Max H. Strehlow; directors: William Hoberg, F. E. Burrall, George W. Ellis, G. A. Richardson and Alfred W. Lawson.

The company will issue at par \$50,000 of preferred and \$150,000 of common stock, and all money will go into machinery, tools, labor and material. Nearly the entire issue has been subscribed by capital in and close to Green Bay.

OBITUARY

O. P. Stehn, general sales manager of the Hydraulic Pressed Steel Co., Cleveland, died Aug. 5. Mr. Stehn had been with the company for the last 6 years. He was about 40 years old.

New Companies

ALBANY, Aug. 14—The Parker Rustproof Corp. has incorporated for \$2,500,000. The directors are A. Foshay and E. Praxmareer, 120 Broadway, New York, and E. E. Hurley, Brooklyn.

CLEVELAND, Aug. 11—The Wager Aeronautical Motor Co. has been formed with an authorized capital of \$200,000. The concern will establish a plant in Cleveland for the manufacture of airplane engines of high power. Incorporators are: H. H. Brelsford, C. B. Corlett, S. G. Fleisher, A. L. Hamminck and L. A. Osten.

GRAND RAPIDS, MICH., Aug. 8—The Monarch Storage Battery Co. has been organized in this city and will manufacture Monarch storage batteries. T. H. Lavier is president of the new company. It is expected that the company will employ between 100 and 200 men.

GEORGETOWN, DEL., Aug. 11—The National Tractor Co. has been incorporated with a capital of \$2,500,000 to manufacture tractors and parts. The incorporators are Woodburn Martin, C. W. Cullen and Albert Worth, all of this city.

LORAIN, OHIO, Aug. 11—The Universal

Bearing Co. has been incorporated with an authorized capital of \$10,000 to manufacture bearings for automobile construction. The incorporators are: H. J. Yeckley, A. E. Robinson, Milton Hellmyer, Marian D. Hunt and A. A. Hees.

ALBANY, N. Y., Aug. 13—The Angola Tire & Rubber Co., Inc., of Buffalo, with a capital of \$1,000,000, was incorporated in Albany yesterday. The company will manufacture automobiles and deal in tires and rubber goods. Frank M. Wood, Marcus M. Levy and Stephen C. Kelly, all of Buffalo, are the incorporators.

INDIANAPOLIS, IND., Aug. 13—The Schroeder Headlight Co., Evansville, Ind., heretofore engaged in the manufacture of locomotive headlights exclusively, has increased its capitalization from \$10,000 to \$25,000, and a line of automobile headlights and searchlights will be marketed. A. M. Weil, an Evansville capitalist, has purchased control and will be president.

CLEVELAND, Aug. 11—The Pearl Manufacturing Co. has been incorporated with a capital of \$10,000 to manufacture automobile parts of many varieties. In-

corporators are: J. H. Holmes, H. Decker, Sam Goertz, P. H. Langguth and E. Grisbel.

TEXARKANA, TEX., Aug. 11—What is destined to ultimately be made one of the larger plants in the United States for the manufacture of farm tractors, motor trucks and various other kinds of farm machinery, will soon be constructed here by a syndicate of Quincy, Ill., men. The initial plant, it is announced by G. M. Stone, who is at the head of the syndicate, will cost approximately \$100,000. The site has already been purchased and erection of the buildings will be started as soon as the plans for same are drawn and approved. It is the purpose of Mr. Stone and associates to construct new types of farm tractors and motor trucks. Associated with him are: H. C. Lloyd, W. T. Brady and J. L. Fulton, all of Quincy, Ill. Mr. Fulton is mechanical engineer.

DAYTON, OHIO, Aug. 2—The P. T. Wheel Co. has been incorporated with a capital of \$50,000 to manufacture automobile wheels. The incorporators are G. H. Gorman, E. J. B. Gorman, A. M. Leoni, A. B. B. Gorman and O. B. Brown.

Factory

White Co., Cleveland, is building a \$300,000 addition to its factory which will be 125 by 500 ft. of concrete and steel and two stories high.

Olds Motor Works, Lansing, Mich., is adding to its large plant a two-story structure, 80 by 400. The lower floor will be used for the storage of materials, and the upper for the inspection and care of new cars.

Hill Pump Valve Co., Chicago, is making a specialty of castellated nuts, and has placed W. E. Babler, formerly of the National Acme Co., Cleveland, as manager of this department, recently established. This company has had a few automatic screw machines to manufacture certain parts for the Utility pumps, heaters and wrenches, and in addition,

has accepted now and then an order from some of the leading automobile makers for castellated nuts and other screw machine parts.

This business has promised such a bright future that the company has purchased twenty-six new multiple spindle automatic screw machines together with additional lathes, drill presses, etc., to take care of increased screw machine business.

Ford Motor Co., Detroit, will build a four-story addition to plant No. A.

Lapeer Truck Co., New Haven, Mich., has purchased 8 acres of land and will erect a new modern factory.

Winkley Mfg. Co., Detroit, will build a three-story addition.

PRODUCTION

NEW YORK, Aug. 13—Sales of the Chandler Motor Car Co. for July totaled 1720 cars as compared with 1320 for the same month in 1916. The first 7 months of this year sales were 12,451 cars as compared with 8235 to July 31, 1916.

July was the first month in which the new \$200 price increase became effective, so that the steady increase of sales is all the more significant when compared with the corresponding month last year, when prices were \$300 lower than now.

DETROIT, Aug. 13—The Paige Motor Car Corp. shipped, sold and delivered more cars in July than in any other month in its history and was only able to fill about 58 per cent of the orders received during July.

Factory

Studebaker Corp., South Bend, Ind., has awarded a contract for the construction of a power plant 123 by 87 ft. The plant will be of steel and brick construction, and two immense smoke stacks will be constructed. The building will cost about \$100,000.

Barnes Foundry & Mfg. Co., Detroit, the new \$2,000,000 Detroit corporation, organization of which was recently announced in THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES has secured a 30-acre site in River Rouge and Ecorse. Erection of the plant will begin at once and production will start early this coming winter. The foundry department will be the first in operation, and as soon as it is completely installed the machine department will be added. The company, which has been formed because of the need existing in the automotive industry, will specialize in cylinders and pistons, but will be in a position to make all types of gray iron castings. The site will be served by the Michigan Central Pennsylvania and D. T. & I. railroads and by a ship canal with a 30 ft. channel.

Dural Rubber Corp. has acquired a 5-acre site with buildings at Flemington, N. J., to be devoted to the manufacture of aircraft rubber equipment, automobile tires, tubes, etc., and to be sold under the name of Dural. The officers of the company are E. H. Wilson, president and general manager; W. C. Ehrenfeld, vice-president; Caleb S. Green, treasurer; G. F. Ginglen, secretary.

Hydraulic Pressed Steel Co., Cleveland, will erect a building containing a restaurant and assembly hall for its employees at a cost of \$55,000.

Jenkins Vulcan Springs Co., St. Louis, Mo., will locate its plant at Richmond, Ind., as soon as possible. The company,

which has a capitalization of \$300,000, manufactures automobile springs. About one-third of the stock is held by Richmond business men. The company's new plant will occupy an 80-acre site.

C. R. Wilson Body Co.'s plant, Bay City, Mich., will be completed about Sept. 1.

Comet Automobile Co., Decatur, Ill., will open bids shortly for the first unit of the factory designed to construct automobiles. It is hoped to have the first

structure completed before cold weather. This will be a one-story structure, 150 by 600 ft. It will be utilized for assembling parts, building bodies and painting and trimming.

Conestoga Motor Truck Co., Lancaster, Pa., will build its first plant, 60 by 200, there, to be ready for operation Oct. 15. For the present Conestoga trucks will be assembled in temporary shops.

Higrade Motors Co., Grand Rapids, is practically on the eve of embarking upon quantity production of the $\frac{3}{4}$ -ton Higrade trucks. The first experimental truck has completed 6000 miles of service.

Indian Refining Co., New York, is distributing a small 35-page atlas showing maps of the countries at war in Europe. It also includes an oiling diagram of a car and charts, tables and other information.

Kales-Haskel Co., Detroit, has changed its name to the Kales Stamping Co.

Michigan Hearse & Motor Co., Grand Rapids, Mich., has acquired additional land and will erect a plant for the manufacture of limousines on a large scale.

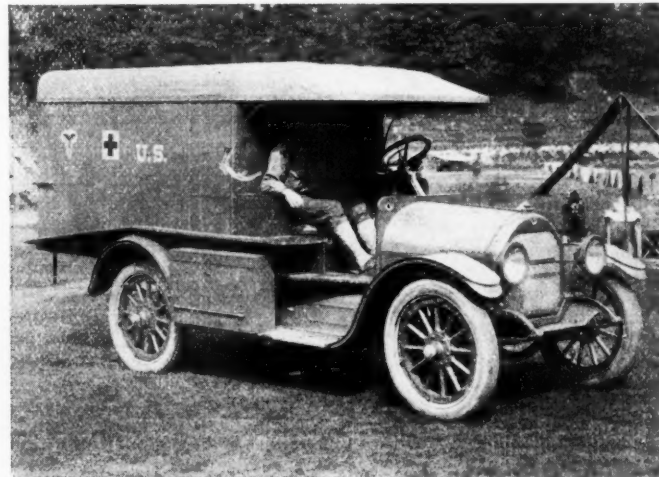
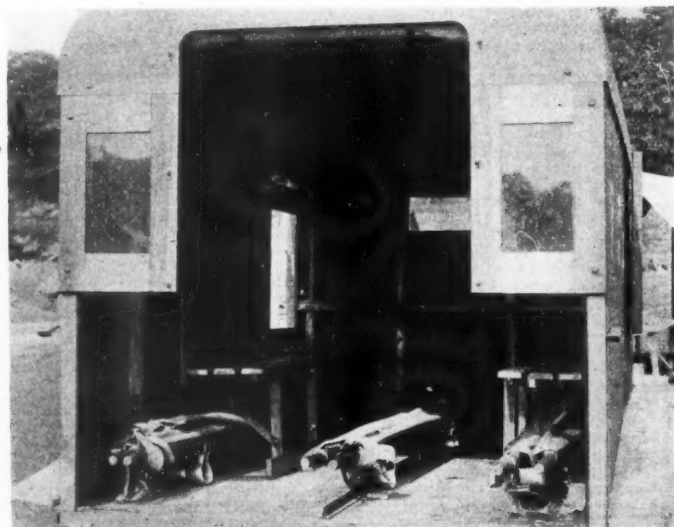
Duplex Truck Co., Charlotte, Mich., has arranged so that its 200 employees can devote one day in August for co-operating in harvesting with the farmers in the territory surrounding Charlotte.

Universal Truck Body Co., Jonesville, Mich., is erecting a new factory and will greatly expand its business.

Saxon Motor Car Corp., Detroit, has closed a contract with the Loveland company as Saxon distributors for Detroit, Cleveland and Buffalo, amounting to \$1,-

Overland Red Cross Ambulance

TOLEDO, Aug. 10—Willys-Overland Inc. has placed on the market a special Red Cross ambulance completely equipped for \$1,250, f.o.b. Toledo. The ambulance body is of the regulation French army and Red Cross type. The body has a frame of selected ash. The sides are weatherproof and light. Brass and nickel screws are used instead of nails. The top is of 10-oz. regulation duck over poplar slats. A 16-gal. water tank is carried on one running board; a large emergency box on the other. Three regulation army litters with blankets are added to the regular equipment. The body is made collapsible to facilitate overseas shipping. The car is made appropriate for donations by the attachment of a brass plate 2 ft. long on which the names of the donors can be inscribed. Willys-Overland Inc. points out the advantages of the use of its ambulances in the great number of cars already in use in France which insures a large force of skilled mechanics who will be able to give service on Willys-Overland ambulances. The company also maintains large stocks of parts at London and Paris.



Willys-Overland Red Cross ambulance, which sells for \$1,250

732,000. The company has also closed contracts with the Hathaway Motor Co., Kansas City, and with Philadelphia and Des Moines distributors for more than \$1,000,000 each. Other contracts have been closed in Albany, Cincinnati, Columbus, Hastings, Neb., Richmond, Dayton, Ohio, and Oklahoma City.

Kahlenberg Co., Two Rivers, Wis., a large maker of marine and other engines, is now manufacturing crude oil engines which embody a new design of igniter tube invented and patented by William R. Kahlenberg, head of the company and its chief engineer.

Ten Broeck Tyre Co., Louisville, Ky., is constantly adding to its plant and is working a double force to take care of

business. Its most important addition is a cotton plant to manufacture its own fabrics.

Allen Motor Co. distributors and salesmen recently held their third annual convention, opening at Fostoria and closing at Toledo, Ohio. The chief matters discussed were the 1918 models which will be announced to the public soon.

Joseph Dixon Crucible Co., Jersey City, N. J., has just published a new booklet descriptive of its graphite automobile lubricants.

Detroit Starter Co., Detroit, Mich., has given the distributing rights for the United States and foreign countries to the Motor Car Equipment Co., New York,

for its output of Speederators, a device providing a foot throttle to take the place of the hand throttle on the Ford steering post.

Zenith Carbureter Co., Detroit, is building an addition to its present factory which will permit an increase of 80 per cent in production capacity.

Elgin Tractor Co., Elgin, Ill., it is stated, will remove its plant to Piqua, Ohio. Work has already commenced in remodeling a building to house the plant.

Motor Parts Co., Philadelphia, has concluded contract with the Westinghouse Electric & Mfg. Co. for sole selling rights on its Ford starting and lighting equipment.

Calendar

ASSOCIATIONS
Oct. 9-11—Pittsburgh National Assn. of Purchasing Agents, Convention.

CONTESTS
Aug. 17—Flemington, N. J., Track Race.
Sept. 3—Uniontown, Pa., Speedway Race.
Sept. 3—Cincinnati, O., Speedway Race, Championship.
Sept. 6—Red Bank, N. J., Track Race.
Sept. 8—Hillclimb, Pike's Peak, for stripped stock chassis.
Sept. 15—Providence, R. I., Speedway Race.
Sept. 22—Allentown, Pa., Track Race.

Sept. 28—Trenton, N. J., Track Race.
Sept. 29—New York Speedway Race.
Oct. 6—Danbury, Conn., Track Race.
Oct. 6—Uniontown, Pa., Speedway Race.
Oct. 13—Richmond, Va., Track Race.
Oct. 13—Chicago Speedway Race.
Oct. 27—New York Speedway Race.
Oct. 24—Columbus, Ohio, Dixie Highway Tour.

S. A. E.
Aug. 6—Motorcycle Division, Atlantic City.

SHOWS
Sept. 2-9—Spokane, Wash., Interstate Fair.
Sept. 3-7—Indianapolis, Indiana State Fair, Indianapolis Auto Trade Assn.
Sept. 9-15—Milwaukee Show, State Park Fair, West Allis.
Sept. 9-15—Milwaukee, Wis., Fall Show, Wisconsin.
Sept. 17-24—Grand Rapids, Show, Automobile Business Assn.
State Fair, West Allis, Milwaukee Automobile Dealers.
Sept. 18-21—Toronto, Annual Tractor Show, Canadian National Exhibition.

Oct. 1-6—Buffalo, N. Y., Closed Car Show, Automobile Dealers' Assn., Elmwood Music Hall.
Oct. 13-28—Dallas, Tex., Dallas Automobile & Accessory Dealers Assn. State Fair.

1918

Jan. 5-12—New York Show, Grand Central Palace, National Automobile Chamber of Commerce.
Jan. 19-26—New York, Motor Boat Show, Grand Central Palace, National Assn. of Engine and Boat Manufacturers.
Jan. 19-26—Montreal, Show, National Motor Show of Eastern Canada, Montreal Automobile Trade Assn.

Engineering

American Railway Master Mechanics' Assn.
American Institute of Electrical Engineers.
Master Builders' Assn.
American Society of Heating and Ventilating Engineers.
Association Iron and Steel Electrical Engineers.
Mining and Metallurgical Society of America.
Society of Automotive Engineers.

Illuminating Engineering Society.
National Electric Light Assn.
National Gas Engine Assn.
American Society for Testing Materials.
American Institute of Metals.
American Foundrymen's Assn.
Society Naval Architects and Marine Engineers.

AUGUST
20—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
21—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

SEPTEMBER
1—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
8—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
10-14—Assn. Iron & Steel Elec. Engrs. annual convention at Phila.
10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.
13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.
14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
15—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
20—Mining & Met. Soc. of Amer. monthly meeting N. Y. section at Engrs. Club.
24—Amer. Inst. Metals at Boston.
24—Amer. Fdry. Assn. annual meeting at Boston.

OCTOBER
6—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.
11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.
13—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
15—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
17-18-19—Amer. Gas Inst. at Washington, D. C.

18—Mining & Met. Soc. Amer. monthly meeting New York section Engrs. Club.
20—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

NOVEMBER
3—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penna. section at Phila.
9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
10—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.
15—Mining & Met. Soc. Amer. monthly meeting New York section at Engrs. Club.
15-16—Soc. Naval Arch. & Marine Engrs. annual meeting.

17—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.
19—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

DECEMBER
1—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.
8—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.
10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.
11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.
13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.
14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.
15—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.
17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.
20—Mining & Met. Soc. Amer. monthly meeting New York section at Engrs. Club.